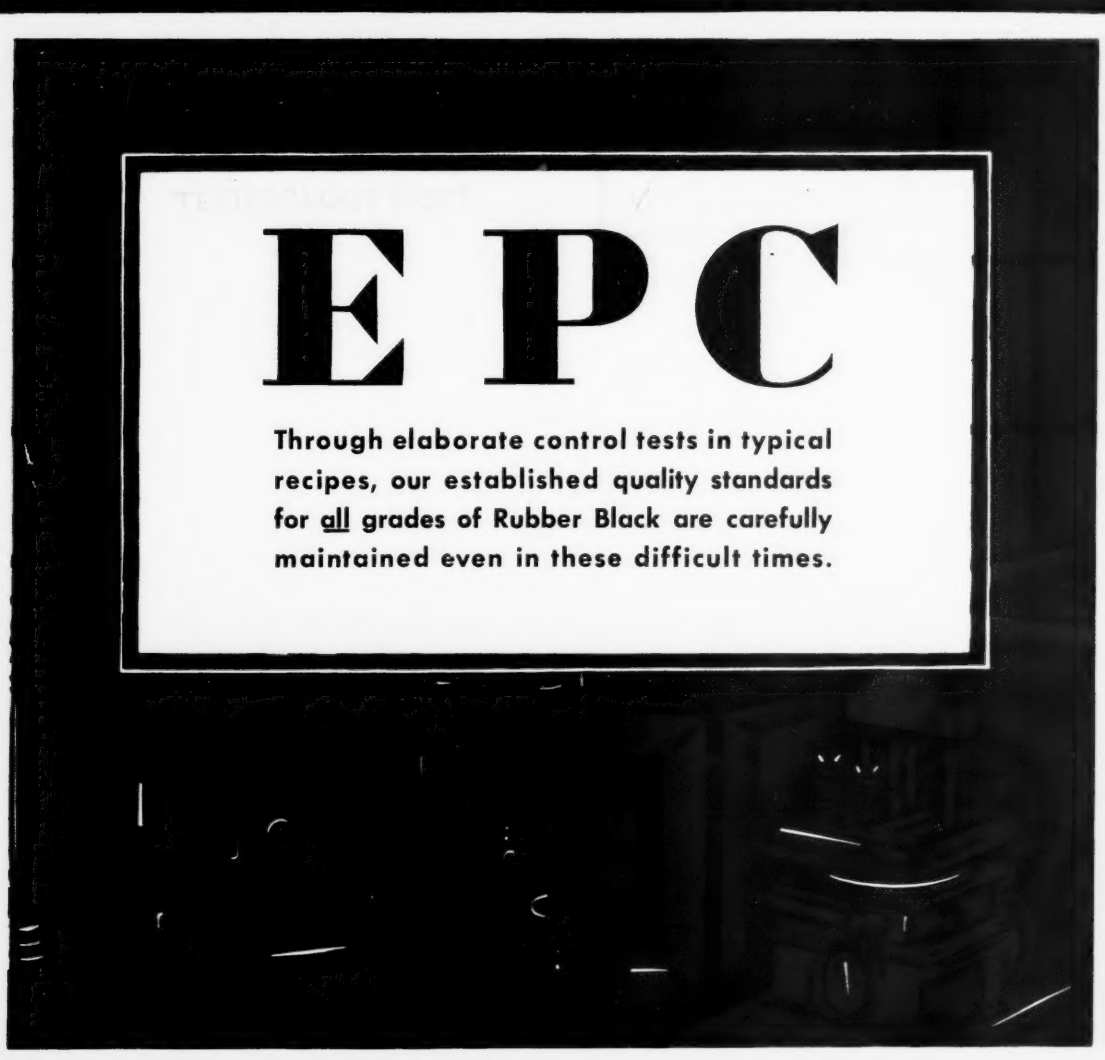
WORLD

SYNTHETIC

JULY, 1944

EPC

Through elaborate control tests in typical recipes, our established quality standards for <u>all</u> grades of Rubber Black are carefully maintained even in these difficult times.



Newsletter No. 7
JULY, 1944
Published by Rubber Chemicals Division of DU PONT

BREAKDOWN GR-S WITH RPA No. 5

NOW that production of GR-S is rapidly approaching the goal set by the Office of the Rubber Director, the problem has arisen of processing it into finished products in satisfactory volume to meet requirements. The plastication, mixing and processing efficiency of GR-S on conventional rubber equipment has been variously reported as 50% to 90% of that of natural rubber. Regardless of exactly what the average figure is, it is obvious that to date smaller quantities of GR-S products have been manufactured with a given amount of equipment than could be made from crude rubber.

RPA No. 5 is a chemical peptizing agent which speeds the breakdown of GR-S and helps close the gap between GR-S and rubber in processing efficiency.

RPA No. 5 is a clear light tan colored liquid which, when added to GR-S during mastication, has the following desirable effects:

1. Reduces mastication time necessary to reach a given plasticity or degree of softness.
2. Inhibits the tendency of plasticized GR-S to recover its original toughness during storage.
3. Speeds the rate of incorporation of fillers when mixed on a mill or in the Banbury Mixer.
4. Reduces power consumption.
5. Reduces mixing temperatures to produce safer processing, higher quality stocks.
6. Produces softer stocks which have improved calendering and tubing properties.

AMOUNT OF RPA No. 5 TO USE — The proper amount of RPA No. 5 to use depends on such factors as (1) the type of mastication equipment employed, (2) the properties of the particular GR-S in question and (3) the end results desired. For most purposes we suggest the use of the amounts indicated below:

MASTICATING EQUIPMENT	% RPA No. 5 on GR-S
Mill	1 —2%
Banbury	0.5 —2%
Gordon Plasticator .	0.25—1%

IMPROVED EQUIPMENT EFFICIENCY — The practical advantages of plasticizing GR-S with RPA No. 5 have been widely demonstrated by both laboratory and factory tests. The following excerpts from test reports are typical illustrations of the effectiveness of RPA No. 5:

1. GR-S was masticated, following which a master batch of 66 pounds of GR-S and 33 pounds EPC black was mixed on a 30-inch mill at a temperature of 125° F. The following tabulation compares the RPA No. 5 treated batch with a control.

	Control No RPA	2 % RPA No. 5
Mastication time to form smooth band (minutes)	6	3
Mixing time to add black (minutes)	13	8
Total time . .	19	11
Plasticity-Recovery (Williams) .	204-75	170-61

The use of RPA No. 5 produced a saving in mastication time of 50% and a saving in total time of 42% over the control.

2. Using GR-S broken down in a Gordon Plasticator, tread stocks were mixed in a No. 11 Banbury Mixer. When 2% of the RPA No. 5 was added with the GR-S in the Banbury Mixer, the resulting stock had lower plasticity and extruded slightly faster than the control stock, even though the remilling operation on an 84-inch mill was omitted in the case of the RPA treated stock.
3. GR-S plasticated with 0.5% RPA No. 5 in one pass through a Gordon Plasticator had a Mooney viscosity equal to a control plasticized in two passes through the Gordon Plasticator without RPA No. 5.

A carcass type stock mixed in a No. 11 Banbury utilizing GR-S plasticized with RPA No. 5 had a lower discharge temperature, consumed less power and had slightly lower plasticity than the control.

	Control	0.5% RPA No. 5
Passes through Plasticator .	2	1
Ammeter readings on Banbury .	50-37	47-35
Discharge temperature of stock °F.	218	213
Mooney plasticity of final mix .	31	29

There was no difference in the way the two stocks handled on the calender.

EFFECT ON CURE—Experimental data are non-conclusive as to the effect of RPA No. 5 on the properties of vulcanized GR-S stocks. There are indications that stocks accelerated with Thionex, MBT, MBTS or DPG are slightly retarded by 1 to 2% of RPA No. 5. With activated accelerators such as SRA No. 2, Zenite B, MBT-DPG and 2-MT Accelerator 808, the vulcanizates have slightly lower modulus and hardness, equal tensile strength and higher elongations at break. With only 0.5% of RPA No. 5 there is essentially no effect.

When as much as 2% RPA No. 5 is used, an increase of approximately 5% in accelerator content will generally produce stocks having essentially the same curing characteristics as the control.

HEALTH HAZARDS—Although experience to date indicates that it is less likely to cause dermatitis than either RPA No. 2 or RPA No. 3, which have been widely used in the industry, we recommend following the same precautions as with the other RPAs. Workmen should wear long sleeved shirts and gauntlet gloves, and should wash thoroughly any parts of the body exposed to RPA No. 5.

DU PONT
RUBBER CHEMICALS DIVISION
BETTER THINGS FOR BETTER LIVING . . . Through Chemistry

INDIA RUBBER WORLD, July, 1944, Vol. 110, No. 4. Published monthly by BILL BROTHERS PUBLISHING CORP., 1309 Noble Street, Philadelphia 23, Pa. Editorial and advertising offices, 386 Fourth Avenue, New York 16, N. Y. U. S. A. Entered as second-class matter October 5, 1889, at the Post Office at Philadelphia, Pa., under the act of March 3, 1879. Subscription, United States and Mexico, $3.00 per year; all other countries, $4.00; single copies, 35 cents.

TECHNOLOGY DEPT.

ANOTHER HYCAR SERVICE FEATURE

TO keep our customers informed on the latest developments in Hycar processing, the Hycar Blue Book has been distributed to interested technical executives and supplemental material for this book will be furnished from time to time. Sections and groupings in this loose-leaf book have been arranged to make it easy to insert this additional information.

Through the Blue Book, we are providing another service that will keep our customers up-to-date in the rapidly expanding field for Hycar.

We regret that, due to paper shortages, it is necessary to make certain restrictions in the distribution of the Hycar Blue Book. Every effort will be made to fulfill all requests for the Blue Book to take care of actual requirements of Rubber Companies and organizations directly serving the Rubber Industry. *Hycar Chemical Company, Akron 8, Ohio.*

Hycar

Reg U. S. Pat. Off.

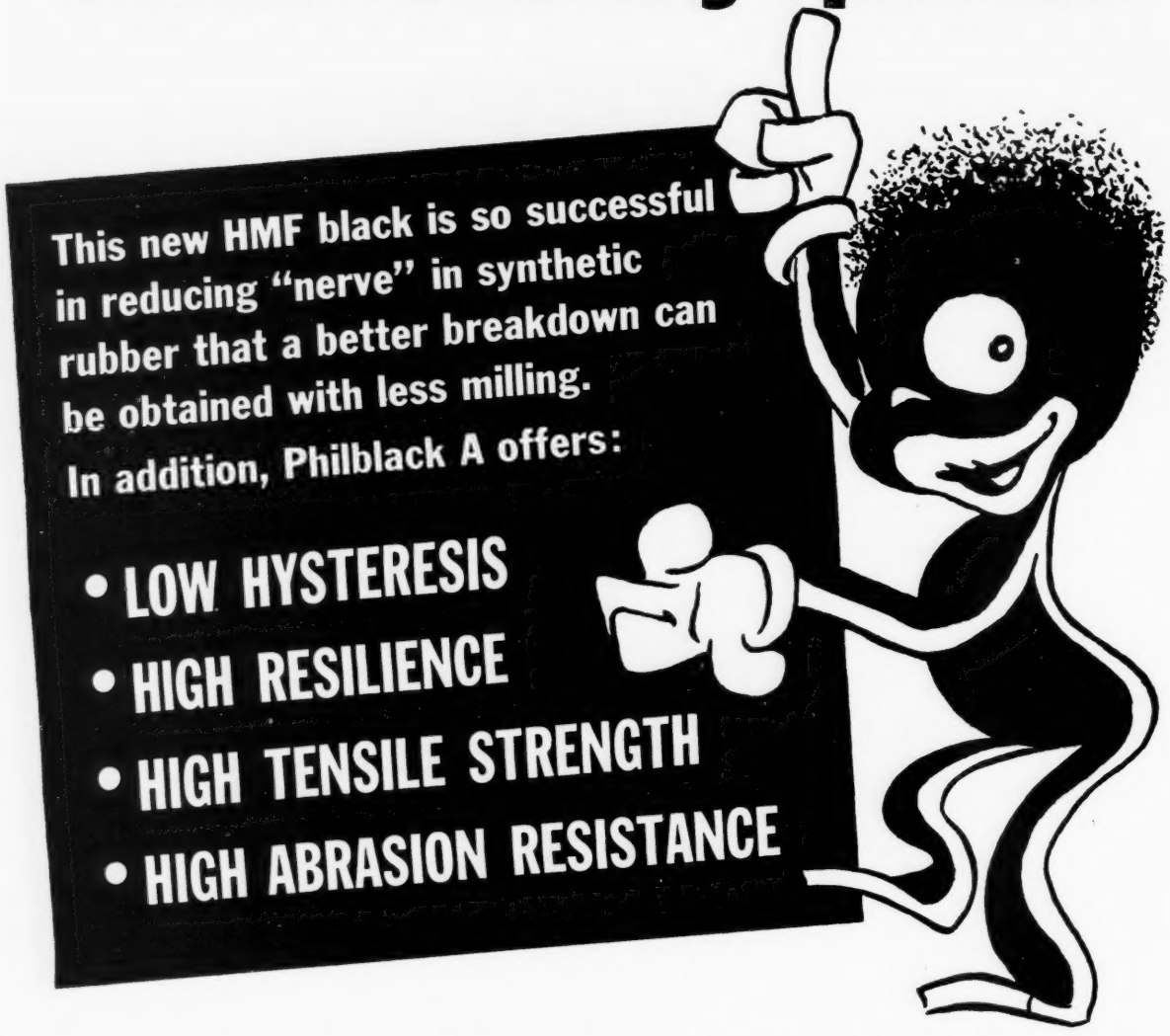
LARGEST PRIVATE PRODUCER OF BUTADIENE TYPE

Synthetic Rubber

Correct pronunciations and meanings of commonly used synthetic rubber names and terms are given in the new pocket-size Hycar Glossary. Write for free copy.

PHILBLACK A

Can Save 1 Milling Operation


This new HMF black is so successful in reducing "nerve" in synthetic rubber that a better breakdown can be obtained with less milling.
In addition, Philblack A offers:
• LOW HYSTERESIS
• HIGH RESILIENCE
• HIGH TENSILE STRENGTH
• HIGH ABRASION RESISTANCE

The properties and advantages of this new and different type black are completely presented in a new booklet "PHILBLACK A". Write or wire for this booklet, prices, availability, and samples.

PHILLIPS PETROLEUM COMPANY
Philblack Division

FIRST CENTRAL TOWER • AKRON, OHIO

WHEN YOU HAVE A CHOICE CHOOSE THE BEST

With the recent rapid progress in conversion to synthetic products, compounds have had to be a compromise between the best and the most available.

Now that the best is available there is no reason for not specifying

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The Naugatuck accelerator for

TIRES • CAMELBACK • SOLES and HEELS

AND ALL PRODUCTS WHERE

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ARE IMPORTANT FOR SERVICE

WRITE FOR BULLETIN: "*BJF—ACCELERATOR FOR GR-S*"

PROCESS • ACCELERATE • PROTECT
with Naugatuck Chemicals

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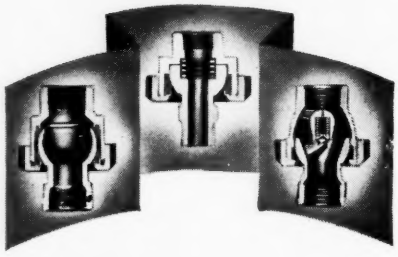
IN CANADA: *Naugatuck Chemicals Division, Dominion Rubber Co., Elmira, Ont.*

Wherever movement is required, or vibration, shock, expansion and contraction affects fluid-conveying pipes you'll find Barco Flexible Joints doing their job. Outstanding conveyors of steam, air, oil, water and chemicals for thirty years, they take every damaging motion into themselves, protecting the pipes. Barco Manufacturing Company, Not Inc., 1810 Winnemac Ave., Chicago 40, Illinois.



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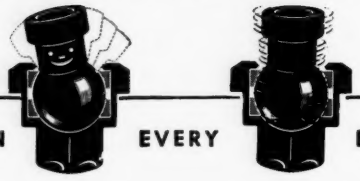
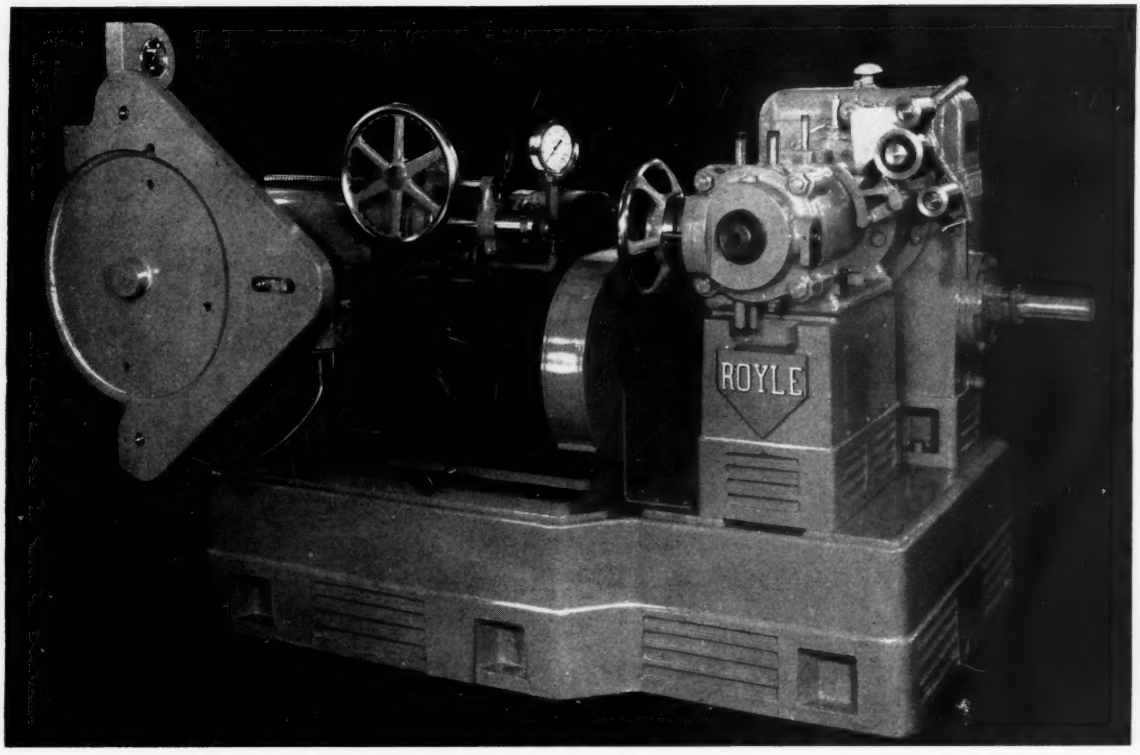
Not just a swivel joint... but a combination of swivel and ball joint with rotary motion and responsive movement through every angle.



"MOVE IN EVERY DIRECTION"



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It took more than an adequate supply of synthetic substitutes to assure the Allied Armed Forces sufficient rubber to take the offensive on all fronts . . . . It took the ingenuity and experience of the rubber and chemical industries to map and to execute imagination staggering production schedules . . . . It took dependable, efficient machines to process these materials into effective weapons of war.

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Two Outstanding Pigments Important to Rubber Compounders

These two Columbia pigments—developed especially for the rubber industry—are winning greater favor every day with Compounders.

Silene EF, a white, finely divided hydrated calcium silicate, confers high modulus, hardness, tear resistance and good tensile strength up to high loadings.

Calcene T, a coated precipitated calcium carbonate product of extremely fine particle size, confers low modulus, high tensile strength, high resistance to tear and abrasion, smooth, fast extension, and good general processing properties.

They're working together in GR:S and other rubbers to produce stocks possessing a wide variety of desirable properties.

If you've yet to become acquainted with these two excellent Columbia pigments, samples and data will be sent at your request.

COLUMBIA CHEMICALS

PITTSBURGH PLATE GLASS COMPANY
COLUMBIA CHEMICAL DIVISION
GRANT BUILDING • PITTSBURGH 19, PA.

CHICAGO • • • BOSTON • • • ST. LOUIS • • • PITTSBURGH • • • NEW YORK • • • CINCINNATI
CLEVELAND • • • MINNEAPOLIS • • • PHILADELPHIA • • • CHARLOTTE

WATER, WATER—a veritable lake of it is required for the daily operation of Columbia plants. Visualize a body of water one mile long, over 500 feet wide and 10 feet deep. Within 24 hours it would be drained completely dry in order to keep Columbia plants in average production.

A THIRSTY CHEMICAL is Columbia Calcium Chloride. Its nature causes it to dissolve itself when exposed to relative humidities above 30-35%. Because of this, a fast-growing use is its employment as an economical dehumidifying agent in basements and other storage areas where dampness must be overcome. Its effectiveness can be gauged by the absorption capacities of one pound of 77-80% Calcium Chloride. At a relative humidity of 70, it absorbs two pounds of water . . . at a relative humidity of 90, it absorbs five pounds of water—or five times its own weight!

TOUGH GOING! In drilling the shafts for Columbia's limestone mine at Barberton, Ohio, 22.6 pounds of dynamite were required for each foot. As the total depth of the two shafts is 4,581 feet, approximately 52 tons of dynamite were used in preparing the way for what is now the world's deepest limestone mine—2,323 feet.

ONLY A V-MAIL letter is always certain to reach its destination overseas. For if the plane carrying your letter is lost, a record of its mail cargo quickly leads to the dispatch of a duplicate copy. Use V-Mail for fast, sure service . . . and to conserve valuable cargo space. One cargo plane can carry 400,000 V-Mail letters. 112 planes are required to transport the same number of standard size letters—an important factor in the handling of 34,000,000 pieces of overseas mail *each week!* And remember—V-Mail is the *only* mail that *always* flies.

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DON'T FORGET THE BACKGROUND

No picture of NAFTOLEN* is complete without its background. For behind NAFTOLEN* stands Wilmington Chemical Corporation with its staff of research chemists, technicians, and technical representatives. This is your assurance of... *suitability* in the application of the product... *quality* maintained in the product... and *service* that goes with the product.

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10 East 40th Street, New York 16, N. Y.

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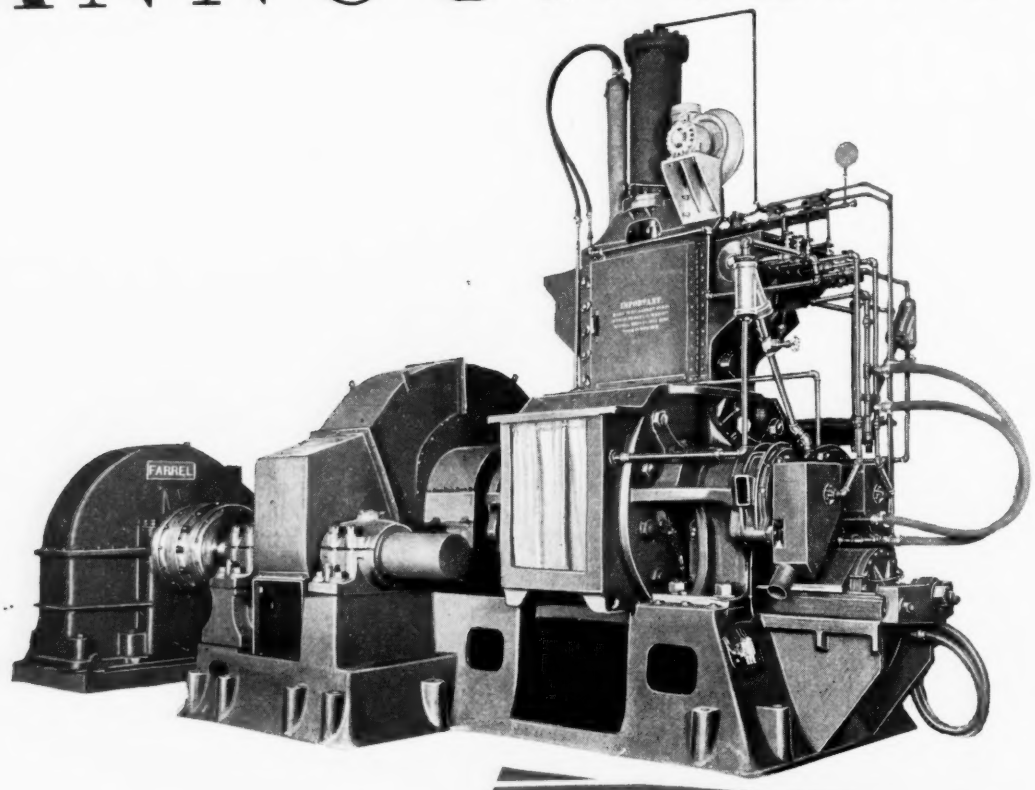
ANNOUNCING



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OVERHAULING, REPAIRING AND REBUILDING
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BANBURY MIXERS

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The Rubber Director's Office in Washington has now granted us permission to return our facilities to the handling of necessary Banbury Mixer repairs.

Heretofore we have been unable to take care of as much of this work as we should like because of limitations imposed upon us by the government. The result has been that a considerable volume of repair work has been done by concerns not properly equipped by knowledge, experience or facilities to handle it.

Under this new program we are prepared to:

1. Send an experienced man to examine and report on the condition of your Banburys.
2. When necessary, return the entire body of the mixer to our plant, where it will be completely overhauled and needed repairs and replacements made.
3. Stand back of all repair work the same as we do on a new machine.

In making use of our facilities, you will know that repairs are being made by:

1. The developer and manufacturer of the Banbury Mixer.
2. The only company which has complete drawings showing original dimensions.
3. The only company having the necessary jigs and fixtures.
4. The only company with an adequate knowledge of Banbury requirements.

If you are in doubt as to the condition of your Banburys, call in one of our representatives. You will receive unbiased advice from a man who understands the basic design principles of the machine. Preliminary inspections will be made without cost or obligation.

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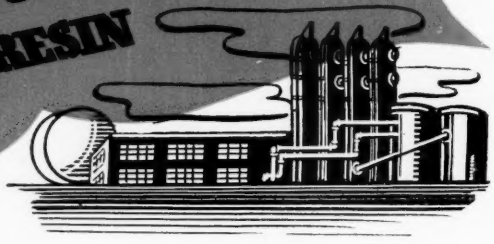

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Distributed to the Rubber Industry by
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—the oil-resisting synthetic with superior processing qualities

QUESTION:	ANSWER:
WHAT IS IT?	A Goodyear-developed synthetic rubber. A copolymer of butadiene and acrylonitrile in a 70-30 ratio. Heat-softening for easy processing.
WHAT ARE ITS USES?	For resistance to aromatic motor fuels, oils and solvents, or where low brittle point is required.
IS IT TESTED?	Thoroughly. Goodyear began developing Chemigum years ago and has been manufacturing it commercially since 1941. Large quantities are being used in military products.
IS IT AVAILABLE?	Yes. Since last Fall, production has exceeded requirements for war equipment made by Goodyear and its subcontractors. An inventory is on hand and will be permanently maintained against allocations.
HOW CAN IT BE OBTAINED?	On approved allocation from the War Production Board, accompanied by your formal order.
IS IT AVAILABLE FOR EXPERIMENTATION?	Yes. Up to fifty pounds may be supplied to any one customer per month for experimental purposes without allocation.
WHERE IS IT MADE?	In a privately owned and operated plant of The Goodyear Tire & Rubber Company at Akron, Ohio.

A PRODUCT OF GOODYEAR RESEARCH

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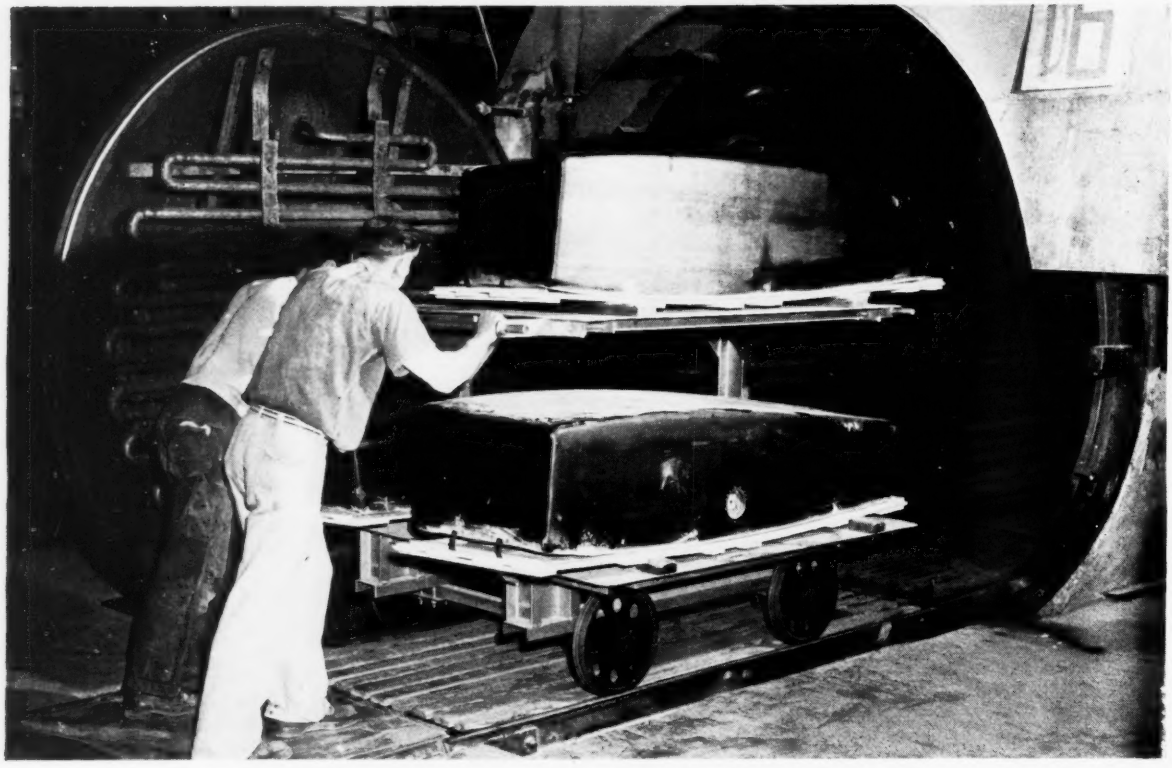
GOODYEAR

THE GREATEST NAME IN RUBBER

BUY WAR BONDS—BUY FOR KEEPS

How PELLETEX Is Helping Save Lives of Our Airforce



Self-Sealing Fuel Cells being placed in the vulcanizer at a plant of U. S. Rubber Co.—Photo courtesy of U. S. Rubber Co.

One reason why so many of our attack bombers get through is due to the marvelous self-sealing fuel tanks with which they are equipped. Made of a synthetic compound containing PELLETEX, these war-wonders seal themselves after hits by bullets, so that fliers cannot be downed by blazing gasoline tanks.

The well-known solvent-resistant properties of rubber compounded with PELLETEX and GASTEX make these leading semi-reinforcing furnace blacks ideal for the purpose.

It gives us much satisfaction to think of this life-saving contribution which we are privileged to make in addition to the many other war uses of our products.

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GENERAL ATLAS CARBON

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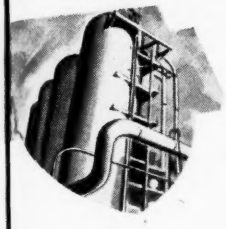
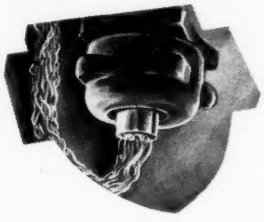
GENERAL CHEMICAL

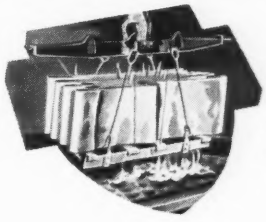
AGAIN GENERAL CHEMICAL CREATES NEW FACILITIES FOR SULFURIC ACID TO SERVE AMERICAN INDUSTRY



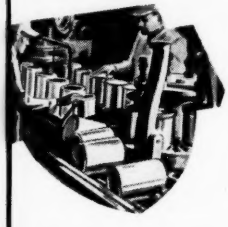
Petroleum
Alkylation, sulfonation, and improving color, odor, and stability of petroleum products.



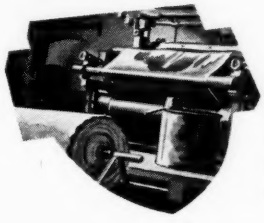
Rayon
Used in the spinning bath in rayon manufacture.



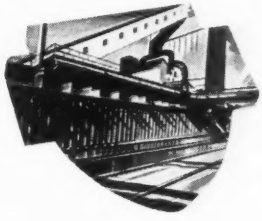
Steel
For pickling of steel sheets and castings; removes oxides and scales.



Paints
Raw material in production of pigments; for sulfonating drying oils.

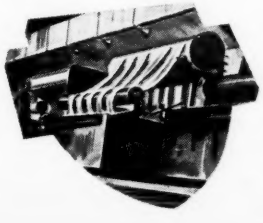


Sulfonation
Sulfonating vegetable oils for water, fire, and mildew-proofing fabrics and textiles.



Coke By-Products
For washing toluene and benzene, raw materials for dyestuffs and explosives.

Fertilizers
Used in super phosphate and ammonium sulfate production.



Textiles
For carbonizing wools and for the dyeing bath in production of textiles.

GRADES OR STRENGTHS
Standard: From 60° Baume to 65% Oleum (114.6% H_2SO_4)
Special High Purity:
Diamond—66° Baume, Carboys Only
Crystal —66° Baume, 98% H_2SO_4
From Carboys to Tank Cars & Barges

RECENTLY RELEASED: New technical information on physical and chemical properties of Fluosulfonic Acid. Write nearest Technical Service office for Bulletin 33A.

GENERAL CHEMICAL COMPANY

GENERAL CHEMICAL COMPANY
NEW YORK 6, N. Y.
Boston • Bridgeport (Conn.)
Denver • Detroit • Houston
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Montreal • Toronto • Vancouver

Since the inception of the rubber reclaiming industry we have met its requirements for scrap rubber expertly because of our long experience, trained organization, and extensive facilities. This background is invaluable in meeting today's demands and insures prompt and satisfactory service.

THE LOEWENTHAL CO.

JACK SIDER, *President* J. K. McELLIGOTT, *Exec. Vice-Pres.*

We Solicit Your Inquiries

188 W. RANDOLPH STREET
CHICAGO 1, ILL.

Cable Address: "Gyblowell"

159 CLEWELL STREET
AKRON 5, OHIO

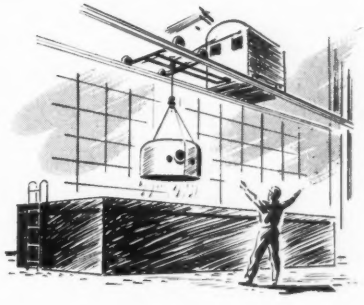
"...It took CHEMISTRY to realize the nation's wealth

American manufacturers once relied on *imported* camphor, an essential ingredient in many important products of industry. When war cut off these imports, however, the *domestic synthesis* of camphor was greatly enhanced by a substance which Hercules' chemists produced from wood turpentine . . . *Alpha-pinene.* This is just one example among hundreds of how Hercules research has helped bring to light the hidden wealth of our natural resources."

DAVID DIETZ, *Science Editor of Scripps-Howard Newspapers, Author, Pulitzer Prize Winner*

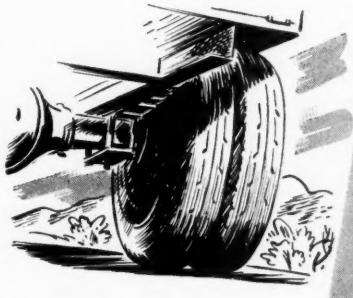
PROTECTING HEALTH from food contamination by flies and other insect germ-carriers is one of the jobs whose importance can hardly be exaggerated . . . a job now handled by a terpene chemical product. Thanite*, the modern toxic agent used in sprays, is in great demand.

WASHING WOOL—saving time. Yarmor* Pine Oil saves up to 30% of the time required for scouring and processing of wool. Yarmor is a wetting agent, lowering surface tension, emulsifying dirt and grease, producing fluffier, cleaner wool, helps get the most out of our wartime supply.



GREASE-GETTER. Another wetting agent is Dresinate*. Dresinate is speeding the production drive by making it easier for alkaline baths to replace solvent baths for *cleaning metals.* Effective in both strong and weak alkaline baths, it has no harmful chemical action on soft metals.

BEST SOLVENT. For many uses besides paints, there is conceded to be no better solvent than turpentine. Hercules produces the finest clear, pure, water-white turpentine which thins and spreads paint without weakening its color, helps dry it fast.



LESS RUTS. Just a small amount of Hercules' amazing new product, Stabinol*, when properly mixed with the top few inches of soil, and then compacted, makes a completely water-proof surface—*preventing mud.*

HERCULES

TERPENE AND ROSIN CHEMICALS

offer answers to material problems in many industries

HERCULES POWDER COMPANY
INCORPORATED

914 Market Street, Wilmington 99, Delaware

*Reg. U. S. Pat. Off. NI-42

BUNA COMPOUNDS

for BONDING, COATING and IMPREGNATING

(Cured and non-cured stocks)

Longtime specialists in the fields of Combining, Coating and Impregnating Compounds, the UBS Laboratories are ideally set up to develop the particular Buna Compounds your operations require. The UBS Laboratories not only know thoroughly the compounding advantages and limitations of all the latest synthetics (Neoprene, Hycar, Buna, Vinylite, etc.), but even have developed an original synthetic latex and synthetic rubber of their own. *Write today, describing your Bonding, Coating and Impregnating Problems.*

Address all inquiries to the Union Bay State Chemical Company, Rubber Chemicals Division, 50 Harvard Street, Cambridge 42, Massachusetts.

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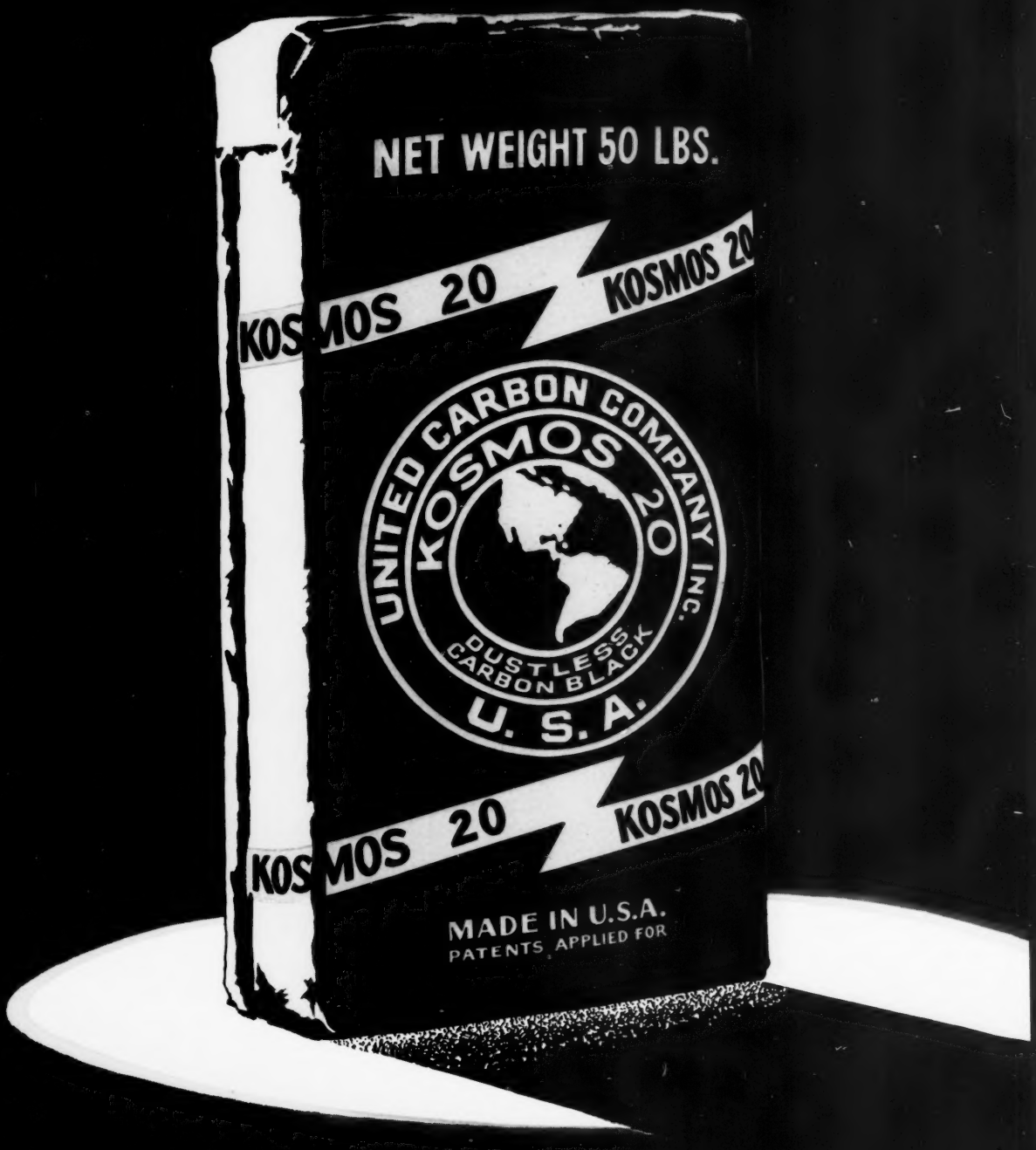
UNION BAY STATE
Chemical Company

Serving Industry with Creative Chemistry

ORGANIC CHEMICALS · SYNTHETIC LATEX · SYNTHETIC RUBBER
PLASTICS · INDUSTRIAL ADHESIVES · DISPERSIONS
COATING COMPOUNDS · IMPREGNATING MATERIALS · COMBINING CEMENTS


NET WEIGHT 50 LBS.
KOSMOS 20
KOSMOS 20
UNITED CARBON COMPANY INC.
KOSMOS 20
DUSTLESS CARBON BLACK
U. S. A.
KOSMOS 20
KOSMOS 20
MADE IN U.S.A.
PATENTS APPLIED FOR

KOSMOS 20

KOSMOS 20 is a semi-reinforcing (SRF) type carbon black made by United's special furnace process.

IDEAL for the GR-S and other rubbers used in military and civilian goods.

OUTSTANDING for ease of processing, good plasticity, fast rate of cure, high resiliency, and low heat build-up.

WELL-KNOWN for uniform quality and performance.

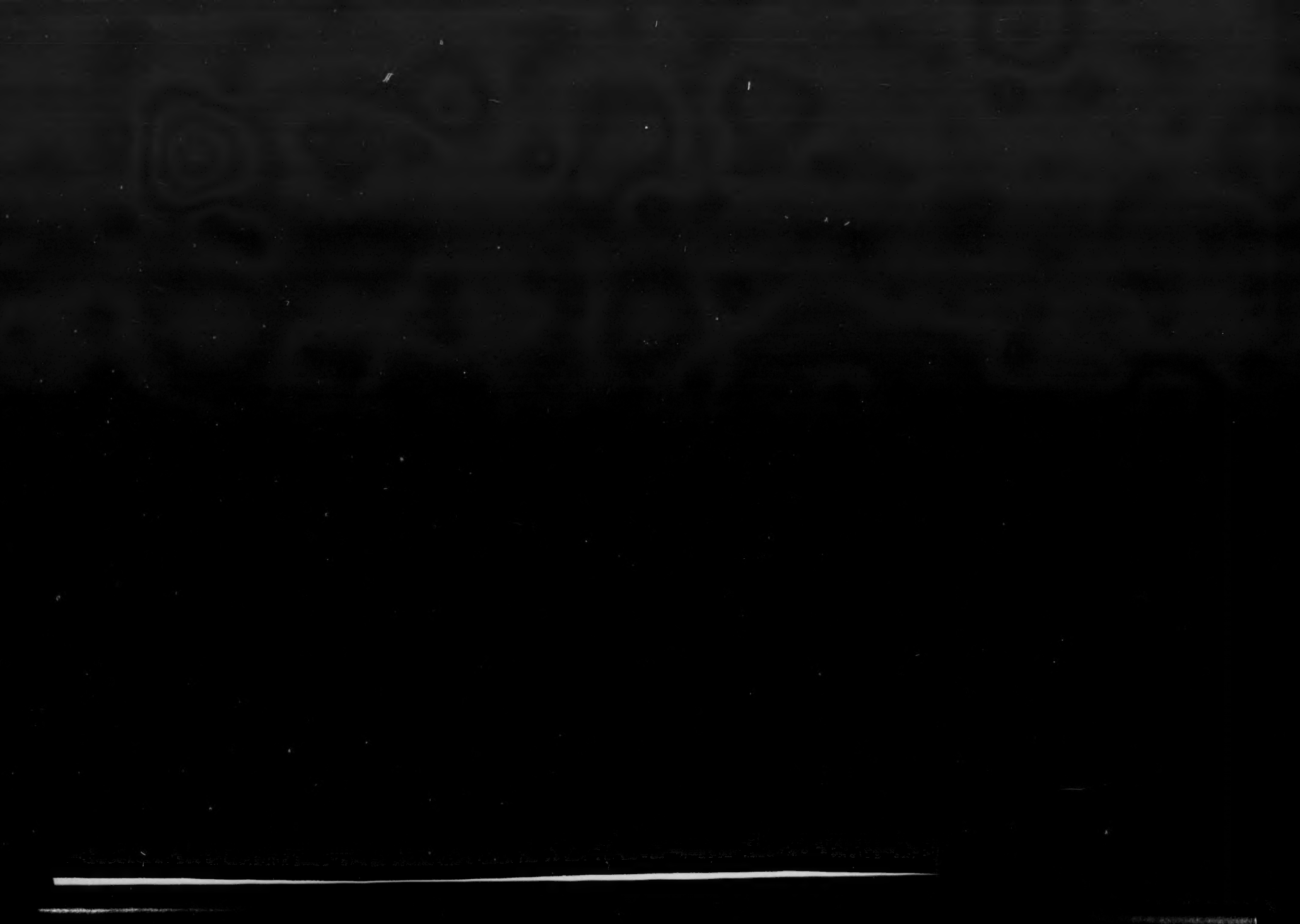
RECOMMENDED for blending with channel black for moderate reinforcement and low heat build up.

KOSMOS 20 is a Strong Rubber Favorite.

RESEARCH DIVISION

UNITED CARBON COMPANY, INC.

Charleston, West Virginia



PARAPLEX G-25

Oil-insoluble non-migratable plasticizer for vinyl resins and Buna-N synthetics

PARAPLEX G-25 is a radically different type of resinous plasticizer, the *first* to combine the desirable properties of ester types with the permanence characteristic of a stable, synthetic resin. Although currently most widely used with vinyl resins and Buna-N synthetics, PARAPLEX G-25 is also compatible, in varying degree, with cellulose nitrate, cellulose acetate propionate, polystyrene, chlorinated rubber, Neoprene and various other elastomers. Using PARAPLEX G-25 as the plasticizer, stocks may be formulated which exhibit these outstanding properties:

1. Resistance to oils, gasoline, and water
2. Excellent heat stability and low volatility
3. Good low temperature flexibility
4. Excellent resistance to ultra-violet
5. Very low heat deformation
6. Good electrical properties
7. Ease of extruding and calendering

PARAPLEX G-25 is not, at present, under allocation, and enlarged production makes it available for important civilian needs as well as military uses. Write today for complete information on this unique resinous plasticizer.

PARAPLEX *is a trade-mark, Reg. U. S. Pat. Off.*

3 awards to The Resinous Products & Chemical Company and its associated firms, Rohm & Haas Company and Charles Lennig & Company.

Represented by Cia. Rohm y Haas, S.R.L., Carlos Pellegrini 331, Buenos Aires, Argentina, and agents in principal South American cities.

THE RESINOUS PRODUCTS & CHEMICAL COMPANY

WASHINGTON SQUARE, PHILADELPHIA, PA.

ANNOUNCING

ANTISOL

A Wax for Imparting to Synthetic Rubbers Improved Resistance to Atmospheric Cracking.

Samples and Technical Data Available

HERRON BROS. & MEYER

NEW YORK
82 Beaver Street

AKRON, OHIO
Ohio Bldg.

TO MEET CRITICAL "SPECS", SPECIFY...WITCO M. R.

An improved hydrocarbon, Witco M. R. increases the resistance to growth of cracks due to flexing in GR-S compounds. In addition, it makes uncured stock more plastic and therefore easier to process. Increased tensile strength and tear resistance....decreased effect of aging on lowering tensile strength, lowering elongation and hardening curing stock . . . decreased modulus and resilience...fill out a combination of properties of Witco M. R. that processors find highly desirable in GR-S formulations.

WITCO CHEMICAL COMPANY

MANUFACTURERS AND EXPORTERS

[Formerly Wishnick-Tumpeer, Inc.]

295 MADISON AVENUE, NEW YORK 17, NEW YORK

Boston • Chicago • Detroit • Cleveland • Akron • London

In Full Scale Production At Continental's New Furnace Black Plant...

Continex SRF

SEMI-REINFORCING FURNACE BLACK

Production of Continental's new line of quality furnace blacks is now under way at full plant capacity after many months of product development and plant construction. Designed specifically for rigidly-controlled production, Continental's new plant at Sunray, Texas, for the present will concentrate on production of a semi-reinforcing black, CONTINEX SRF, which delivers exceptional strength and loading capacity plus higher rebound resilience and long service life.

CONTINENTAL CARBON COMPANY
MANUFACTURER
[CONTINENTAL CHANNEL AND FURNACE BLACKS]

WITCO CHEMICAL COMPANY
DISTRIBUTOR
[FORMERLY WISHNICK-TUMPEER, INC.]

MANUFACTURERS AND EXPORTERS

295 MADISON AVENUE, NEW YORK 17, N. Y. • Boston • Chicago • Cleveland • Akron • Detroit • London

Serving Dependably
Speeding Production

★

★ **ADVAN** — New delayed action accelerator recommended for GRS for footwear, hose covers, CV insulation, etc.

★ **ADVAGUM** — Synthetic thermoplastic used to assist processing of Buna N type synthetics.

★ **ADVAWET** — Series of powerful wetting out and emulsifying agents. Also suitable for stabilizing synthetic latices and dispersions.

★ **COPPER NAPHTHENATE** — Powerful mildewproofing agent. Meets all Armed Forces specifications.

★ **EXTENDER 15** — Extender for dibutyl phthalate and other plasticizers. Readily available.

★ **OROPLAST** — Sulfur reactive plasticizer for GRS.

★ **PLASTOFLEX** — Series of efficient plasticizers for vinyl chloride resins. Good low temperature flexibility.

★ **PLASTOFLEX 10**—Replacement for dibutyl phthalate in Buna N type synthetics. Gives high resilience.

★ **PLASTICIZERS VA** — Plasticizer for vinyl acetate polymers as replacements for latex and for shoe adhesives.

★ **PLASTAC** — Tackifier and plasticizer for GRS.

★ **RESIN V** — Tackifier for GRS, also in adhesive work with GRS latices.

★ **VISTAC** — Series of hydrocarbon polymers being used as tackifiers and processing aids for GRS, Vistanex Polybutene and other rubbers.

★ **ZINC NAPHTHENATE** — Colorless mildewproofing agent for fabrics such as duck, braid, etc. Meets government specifications.

★

ADVANCE SOLVENTS & CHEMICAL CORPORATION

245 Fifth Avenue, New York 16, N. Y.

for **INSULATED WIRE**

Tensile strength

Resistance to aging

Dielectric strength

Write Our Technical Service Dept. for Details

MOORE & MUNGER

33 RECTOR STREET - NEW YORK CITY

A Report to the Owners of

MORE THAN

42,665,000* Vehicles

EQUIPPED WITH

STANDARD TIRE VALVES

A SERIOUS TIRE SITUATION. Because of the critical rubber shortage, the present tires on your vehicles may be all you'll have for the duration. Because of this serious situation, they must be made to last by keeping them free from abuse and properly inflated at all times. It's a fact that a tire underinflated 6 lbs. loses up to 30% of its potential mileage.

Since Pearl Harbor new car, tire and tube production has been limited principally to military and essential war-time needs. Inner tubes equipped with Standard Tire Valves in civilian service today are, on the average, over 5 years old—with millions 10 to 15 years old. Five years and more of constant use with no apparent relief in sight means but one thing—even more wear and tear.

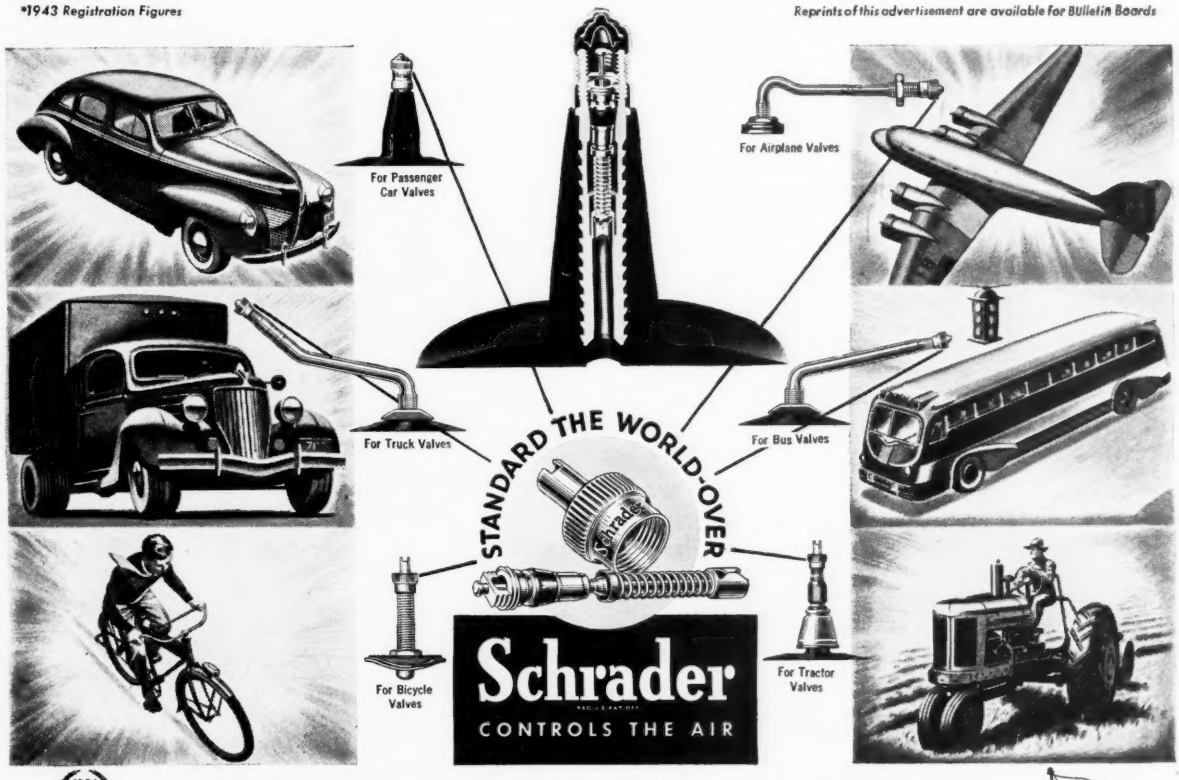
HERE'S GOOD NEWS ABOUT YOUR VALVES! Tire Valves are built with standardized replaceable parts—for your convenience. This standardization that began 46 years ago, is widespread throughout the world today, due to the foresight and progressiveness of the tire and automotive industry. One size valve cap and valve core will fit every one of the more than 189,000,000 standard valves in use in the United States alone. Standard caps and cores may be obtained wherever gas or tires are sold or flats repaired.

WHAT YOU CAN DO TO MAKE YOUR TIRES LAST See that every tire valve is air-tight. 1. Inspect the core to see if it is damaged and replace only if necessary. 2. Be sure that a Standard Valve Cap is on every tire valve, for if a core is damaged and you cannot get another one immediately, the cap screwed down finger-tight absolutely guarantees an air-tight valve seal. 3. If your tire still loses air excessively . . . *after* you have inflated it to the correct war-time pressure and sealed the valve with a Standard Air-tight Valve Cap . . . you know the leak is in the tube. Have the tube fixed immediately, for underinflation ruins a tire, breaks down the side walls and, as a result, the tire cannot be recapped.

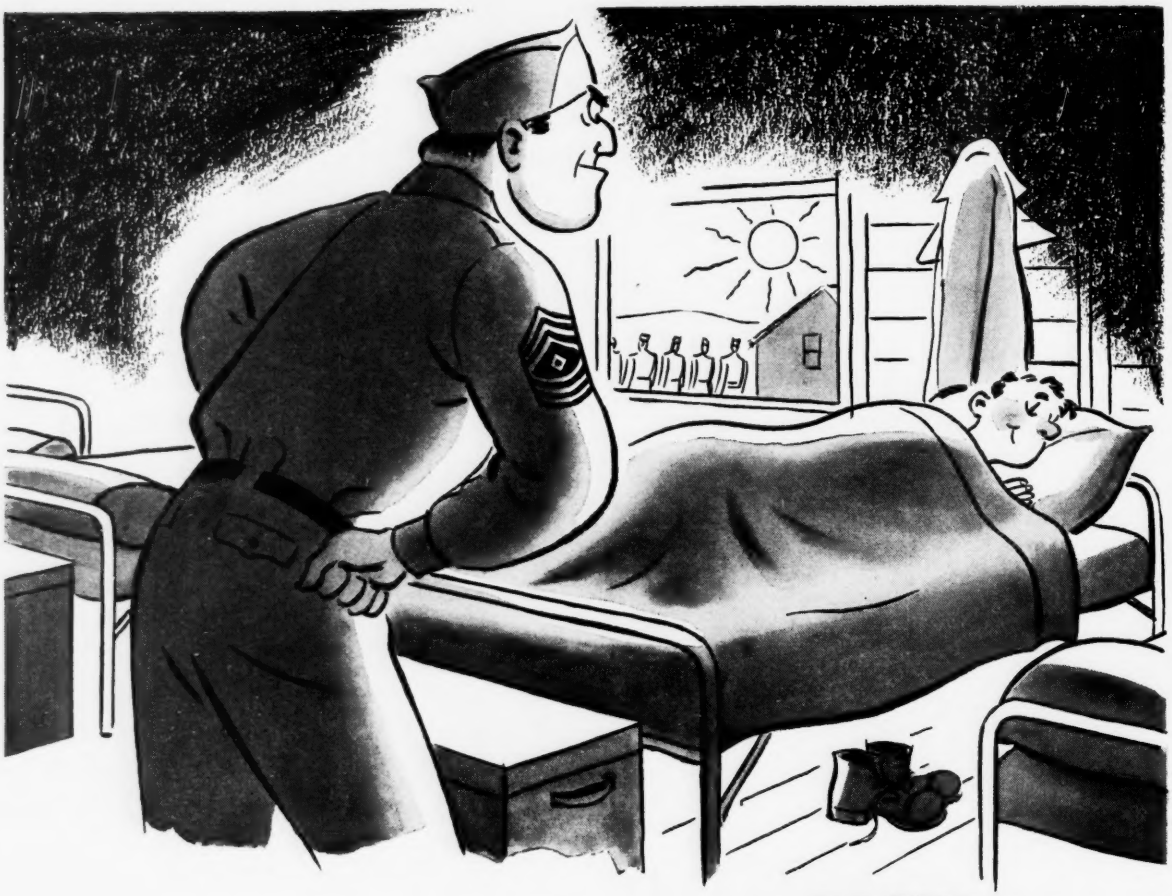
To conserve vital rubber, every man, woman and child should see that a Standard Tire Valve Cap is on every valve. You can tell at a glance when one is needed. Next time you get gas—get air—get air-tight Schrader Caps.

*1943 Registration Figures

Reprints of this advertisement are available for Bulletin Boards



A. SCHRADER'S SON, *Division of Scovill Manufacturing Company, Incorporated,* BROOKLYN, NEW YORK



There's Going to Be a THUNDERSTORM!

Ohmigosh! We hate to look . . .

But it's no worse than the thunderstorm in your business when the solvents fail to meet specifications for uniformity and throw production out of gear all along the line. For in solvents, if there's one thing you've *got to have*—it is *uniformity.*

Hurdle that problem by specifying SKELLYSOLVE. The unvarying uniformity of SKELLYSOLVE is *assured* by our processes of refining it.

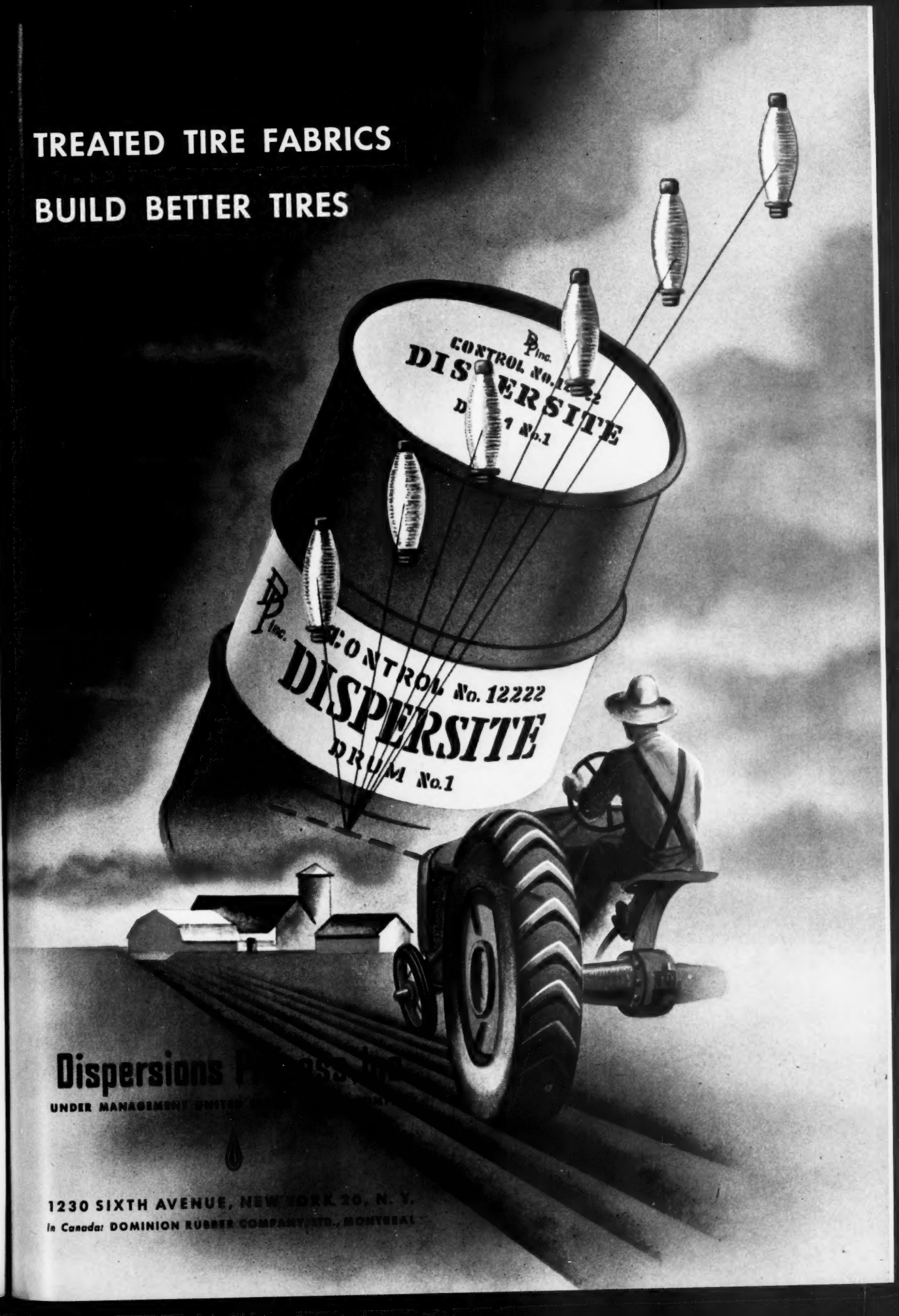
Scientific, instrumented control eliminates the element of human error and the vagaries of thumb rule.

SKELLYSOLVE
in the
RUBBER INDUSTRY

There are six different types of Skellysolve which are especially adapted to various uses in the rubber industry, for making rubber cements, and for many different rubber fabricating operations. Skellysolve offers many advantages over benzol, rubber solvent gasoline, toluol, carbon tetrachloride, etc. It will pay you to investigate Skellysolve. Write today.

SKELLYSOLVE

SOLVENTS DIVISION, SKELLY OIL CO.
SKELLY BLDG., KANSAS CITY, MO.


TREATED TIRE FABRICS
BUILD BETTER TIRES
DP inc.
CONTROL No. 12222
DISPERSITE
DRUM No.1
DP inc.
CONTROL No. 12222
DISPERSITE
DRUM No.1
Dispersions
1230 SIXTH AVENUE, NEW YORK 20, N. Y.
In Canada: DOMINION RUBBER COMPANY, LTD., MONTREAL

Shoe Adhesive Base Materials
We supply synt
and dispersions
synthetic resins
Naugatuck Chemical
DIVISION OF UNITED STATES RUBBER COMPANY
Dispersions Pro
1230 SIXTH AVENUE, NEW YORK 20, N. Y.
In Canada: DOMINION RUBBER COMPANY, LTD., MONTREAL

SERVING NEOPRENE COMPOUNDERS BETTER
BECAUSE OF . . .

A to Z

CONTROL

As K&M receives the Dolomite from nature

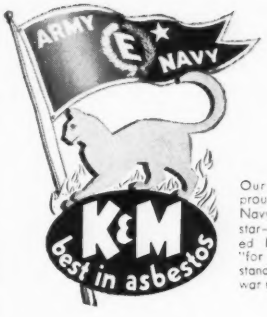
As you receive MgO from K&M

K&M LIGHT MAGNESIUM OXIDE

Neoprene Compounders know they can depend on K&M Light Magnesium Oxide for quality, economy and uniformity. The reason for this always dependable performance is the *complete* manufacturing control which K&M exercises from the time the crude Dolomite rock first arrives at the plant until the finished Magnesium Oxide is packed and ready for shipment.

The rigid inspection standards which this material must meet, each step of the way, are based on K&M's wealth of experience with Magnesia products over the past 70 years.

To meet the continued high demand, Keasbey & Mattison has greatly increased its facilities for Light Magnesium Oxide. It is available *now!*



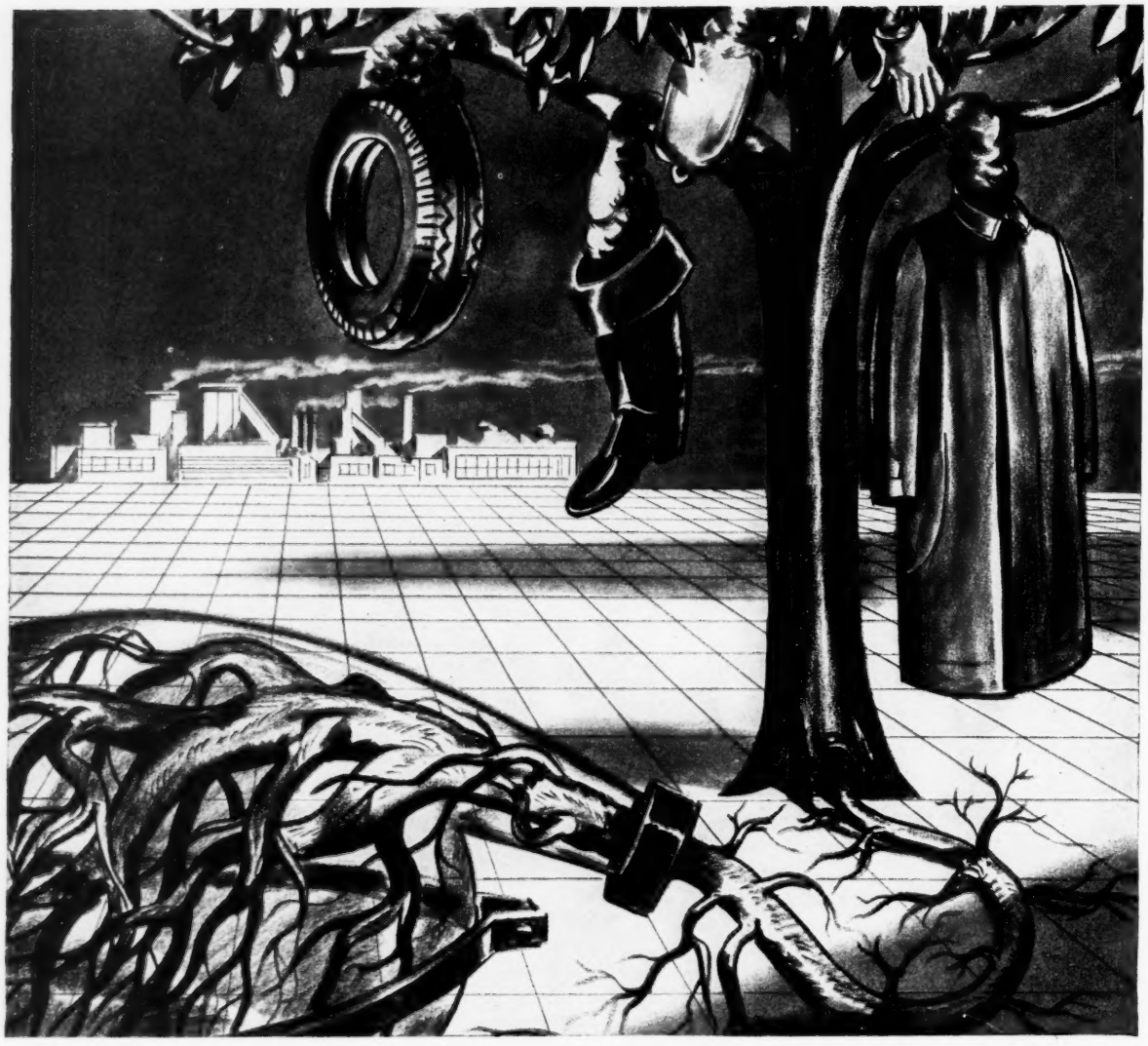
Our Ambler plants proudly fly the Army-Navy "E" flag with its star—an honor awarded K&M employees "for continued outstanding production of war materials."

KEASBEY & MATTISON
COMPANY, AMBLER, PENNSYLVANIA
One of America's oldest and most reliable makers of asbestos and magnesia products . . . since 1873.

OUR DISTRIBUTOR OF K&M LIGHT MAGNESIUM OXIDE IS:

AMERICAN CYANAMID & CHEMICAL CORPORATION
30 Rockefeller Plaza, New York 20, N. Y.

SALES REPRESENTATIVES TO THE RUBBER INDUSTRY AND STOCK POINTS:
AKRON, Ohio, Akron Chemical Company
BOSTON, Mass., Ernest Jacoby & Company
CHICAGO, Illinois, Herron & Meyer
LOS ANGELES, Cal., H. M. Royal, Inc.
TRENTON, N. J., H. M. Royal, Inc.



STRANGE TREE

Two years ago the chemists and engineers of American industry planted a new rubber "tree". Grown from petroleum and grain, and fertilized by coal-tar, this tree will soon yield rubber at the rate of 850,000 long tons a year.

Essential to its phenomenal growth have been a group of basic coal-tar chemicals for which Barrett is a key source of supply. These chemicals are valuable in the processing of every type of rubber—synthetic, natural and reclaim—helping to make them more usable and imparting to them a wide variety of desirable characteristics.

The knowledge and experience of Barrett research chemists and engineers are available to you in adapting these chemicals to your requirements. Your inquiries will receive prompt, efficient attention.

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

Barrett Rubber Compounding Materials—Carbonex* • Carbonex S • Carbonex S Plastic • Cumar* • Bardol* • Bardol* B • Dispersing Oil No. 10 • Dispersing Oil No. 64 • B.R.H. No. 2* • B.R.T. No. 3* • B.R.T. No. 7* • B.R.V.* • S.R.O. • Reclaiming Oil No. 1621 • B.R.C.* No. 20 • Resin-C-Pitch.

Barrett

ONE OF AMERICA'S GREAT BASIC BUSINESSES

*Trade-mark Reg. U. S. Pat. Off.

Rough sliding means trouble!

Exclusive Crown Zipper tooth construction assures quick, smooth, effortless sliding, even around sharp curves!

Look at a Crown Zipper closely, and what do you see? Each individual tooth is identical on both sides!

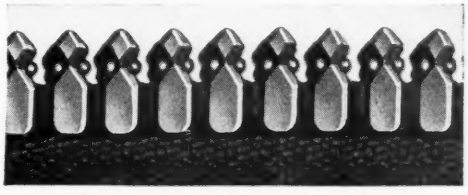
This exclusive Crown design permits the sliders on Crown Zippers to move with perfect freedom in both directions along the zipper track.

Even on heavy aircraft and truck-tractor covers, Crown Zippers operate quickly, smoothly, almost effortlessly—take sharpest curves without sticking or bunching the fabric.

This big, basic Crown Zipper advantage is but one of *many* Crown superiorities that will make for better service in postwar rubber goods applications.

Actually, Crown engineers, working in the field with our armed forces, have developed *five* advancements over old-style, conventional zippers. (See complete list of Crown Zipper superiorities below.)

When *you* turn to postwar, Crown's great backlog of experience in improving zipper design and in adapting zippers to meet special jobs will be invaluable. For our designers will sit down with your own designers to adapt — or, if necessary, *create* — special zipper applications to meet your individual manufacturing needs.



ONLY CROWN ZIPPER TEETH ARE IDENTICAL ON BOTH SIDES, TO INSURE SMOOTH SLIDING!

CROWN ZIPPERS are 5 ways better

1. Takes sharp curves

2. Die-cast for smoother action—extra strength

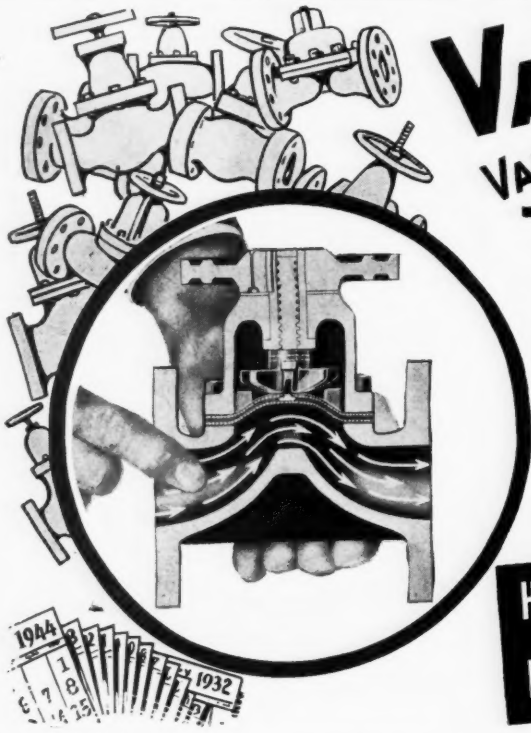
3. Provides opening wherever you want it

4. Won't lock open

5. Resists corrosion

Member of the J. & P. Coats • Clark's O N T *Family*

THE SPOOL COTTON COMPANY • *745 Fifth Avenue, New York, N. Y. (Crown Fastener Division)*



VALVES VALVES VALVES VALVES VALVES VALVES

BUT ONLY HILLS-McCANNA VALVES STAND OUT FOR THEIR COMPLETE FREEDOM FROM OLD-STYLE VALVE FAILURES!

Yes, this Hills-McCanna Diaphragm Valve is so different from ordinary globe and gate valves and plug cocks, both in design and in performance, that it actually initiated a new era in valve practice.

The diaphragm principle, as perfected by Hills-McCanna engineers over 12 years of application, at one stroke, eliminated all the many common valve troubles such as wear, corrosion, clogging, sticking, leaks, drips, failures.

The design *completely* separates all valve working parts from the fluid—no contact, hence, nothing to be eaten away—no reseating or regrinding to worry about. Diaphragm hugs seat tight—permits tight closure even over settled matter.

Use this valve on your pipe lines handling emulsions, latex, soap solutions, mineral acids, alcohol, salt solutions, compressed air, hot or cold water, oxygen and acetylene gases, etc.

STREAMLINED FLOW
—no pockets or ports to clog or reduce pressure. Write for Catalog V-41 . . . it's an eye-opener on modern valve practice.

HILLS-McCANNA
SAUNDERS PATENT
DIAPHRAGM VALVES

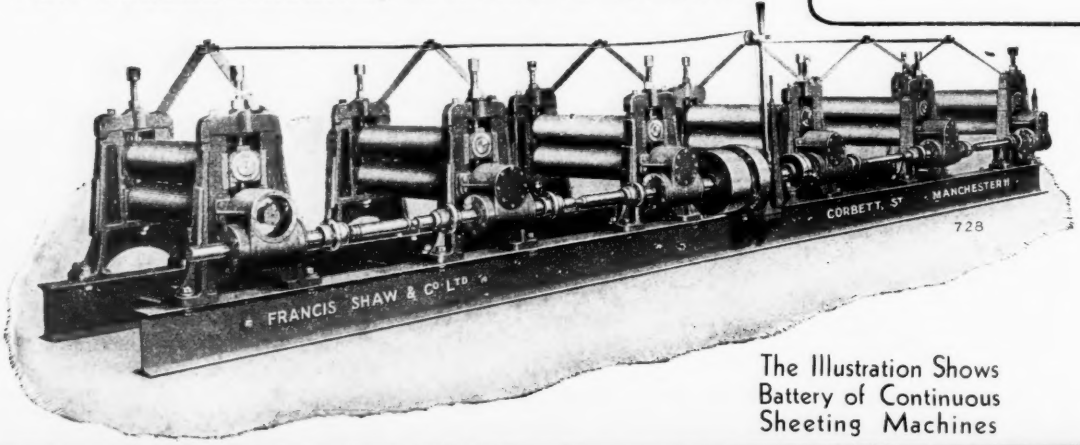
Hills-McCanna have pioneered this valve in the United States since 1932, and therefore offer users extensive application experience. Consult us on your valve problems.

HILLS-McCANNA COMPANY
2364 NELSON ST. MANUFACTURERS OF CHICAGO 18, ILL.
CHEMICAL VALVES . AIR & WATER VALVES . MARINE VALVES
PROPORTIONING PUMPS . FORCE-FEED LUBRICATORS . MAGNESIUM CASTINGS

SHAW RUBBER WASHING MACHINERY

MODERN PLANT FOR RUBBER WASHING, SHEETING & MARKING

Specialists and Principal Suppliers of Plantation and Washing Machinery for over 40 years



The Illustration Shows Battery of Continuous Sheeting Machines

FRANCIS SHAW & CO. LTD., MANCHESTER II. ENGLAND.

R129a

Latest Information on REINFORCING GR-S with ZINC OXIDE

COMPOUND

GR-S	100.0	E.L.C. Magnesia	5.0
Sulphur	4.0	Cumar MH 2½	7.5
Mercaptobenzothiazole	1.5	Zinc Oxide	100.0

In obtaining satisfactory physical properties with Zinc Oxide in GR-S, the experience accumulated in compounding reinforcing amounts of Zinc Oxide in natural rubber is not always applicable. The reinforcing properties of Zinc Oxide in GR-S are influenced to a much greater degree by the proper balance of accelerators, softeners and sulfur than in natural rubber compounds. These properties are also influenced by the presence of organic fatty acids in GR-S, which prevent the dispersion of Zinc Oxide.

The low physical results obtained with conventional treatment (500 psi) probably are due to the failure to procure satisfactory dispersions, indicating the need for special mixing or for special compounding. Early in the work with GR-S it was found that litharge accelerated compounds gave quite satisfactory results. This is now believed to be due to the preferential reaction of litharge with the fatty acids present in GR-S to form soaps, which in turn act as dispersing agents for Zinc Oxide.

Extra light calcined magnesia functions in a manner similar to litharge to form soaps. The coumarone-indene resins are also effective as dispersing agents in GR-S compounds. Working on this theory, special compounds of reinforcing amounts of Zinc Oxide in GR-S with small amounts of extra light calcined magnesia and coumarone-indene resins were prepared, by special mixing, giving the following preliminary results:

TABLE I—Accelerator With MgO, Cumar, and High Sulfur Loadings

Time of Cure Min. at 45 Lb.	Ten. Str. Lb./Sq. In.	Per Cent Elongation	Load (Lb./Sq. In.) For Elongation of: 200%	300%	400%	500%	Permanent Set
7.5	980	935	120	165	245	325	.35
15	1210	800	165	250	330	445	.29
30	1250	650	210	290	455	625	.26
45	1080	590	210	330	455	705	.22
60	1020	560	245	365	490	775	.21
90	1040	530	250	375	580	875	.19

As indicated by the stress-strain and rebound data, the above is a slow-curing compound. Where faster cure is desired, it can be accomplished by the usual adjustments in accelerator and sulfur.

Time of Cure Min. at 45 lb	Shore Hardness	Pendulum Indentation in mm.	Per Cent Rebound	Compression Fatigue (Goodrich Flexometer)* Per Cent Initial Comp.	Running Time and Per Cent Permanent Set	Max. Temp. Rise °C.	Dynamic Compression Initial	Dynamic Compression Final	Cut-Growth Resistance Inches Failure at 9000 Cyc.	Cut-Growth Resistance Inches Failure at 20000 Cyc.
60	47	7.94	55.1	24.7	15′-6.9	20.3	16.5	20.8	.15	.29
90	50	7.83	54.5	23.8	15′-3.4	19.9	15.3	17.9		

*Test Conditions: 100 Lb. Load. 0.15″ Stroke. 100°C Oven Temp.

Work on reinforcing amounts of Zinc Oxide in GR-S is being continued and we shall keep you up-to-date on all new developments.

TABLE II—24-Hour Geer Oven Agings at 100°C

Time of Cure Min. at 45 Lb.	Ten. Str. Lb./Sq. In.	Per Cent Elongation	Load (Lb./Sq. In.) For Elongation of: 100%	200%	300%	400%	500%	Permanent Set
7.5	990	540	165	250	370	575	865	.14
15	720	425	170	300	425	635	...	.11
30	1020	470	170	340	465	720	...	.15
45	940	430	170	345	515	815	...	.14
60	1190	480	210	340	510	805	...	.18
90	1150	480	210	340	465	765	...	.19

The aging results are specially noteworthy in that the elongation is maintained and the modulus does not increase unduly.

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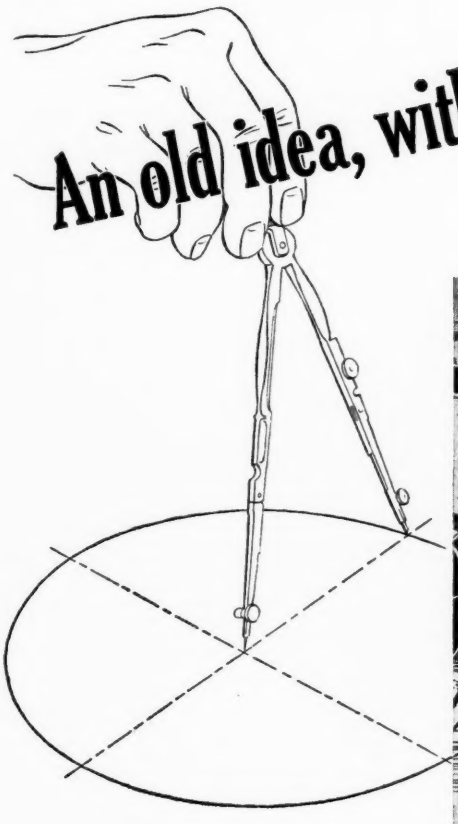

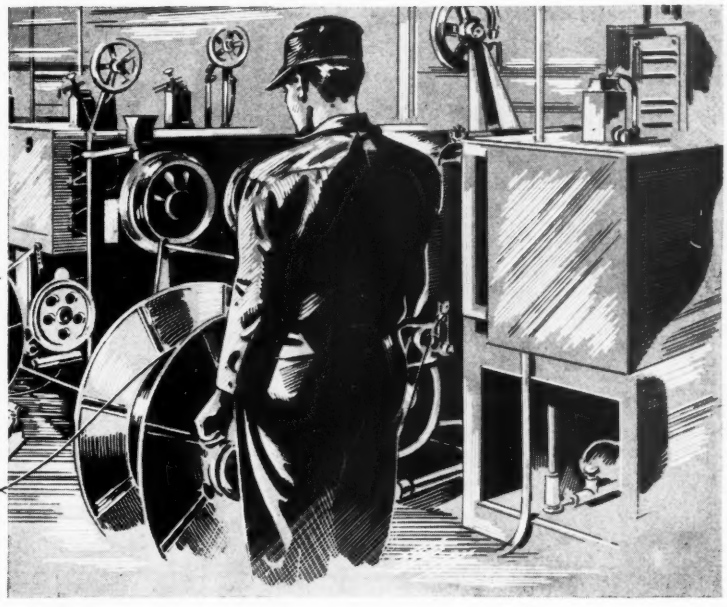

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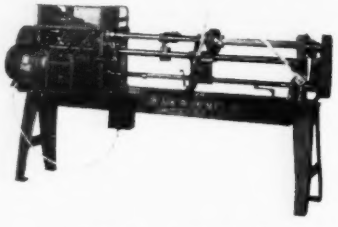

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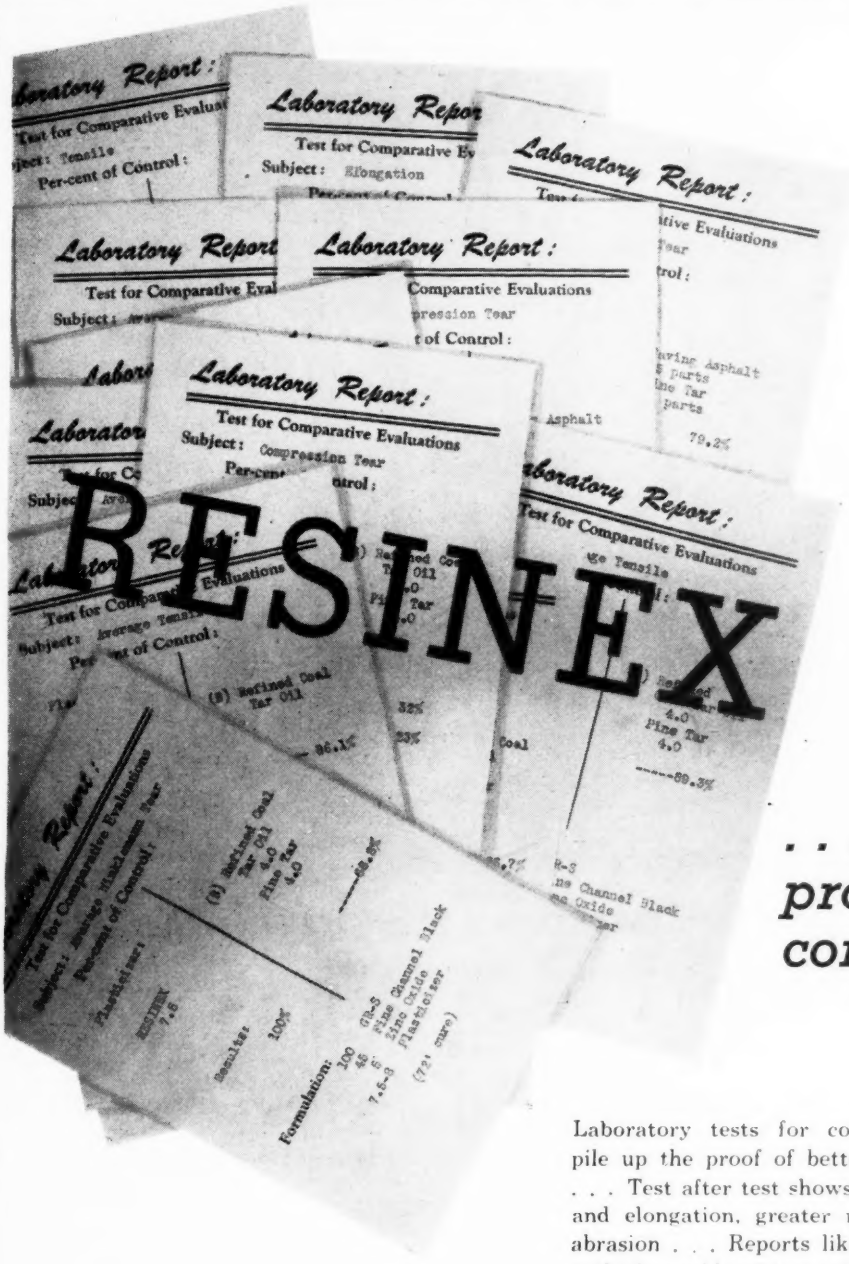

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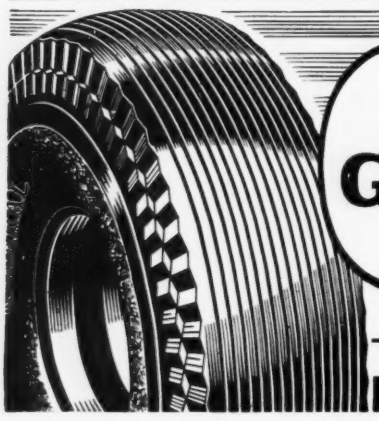

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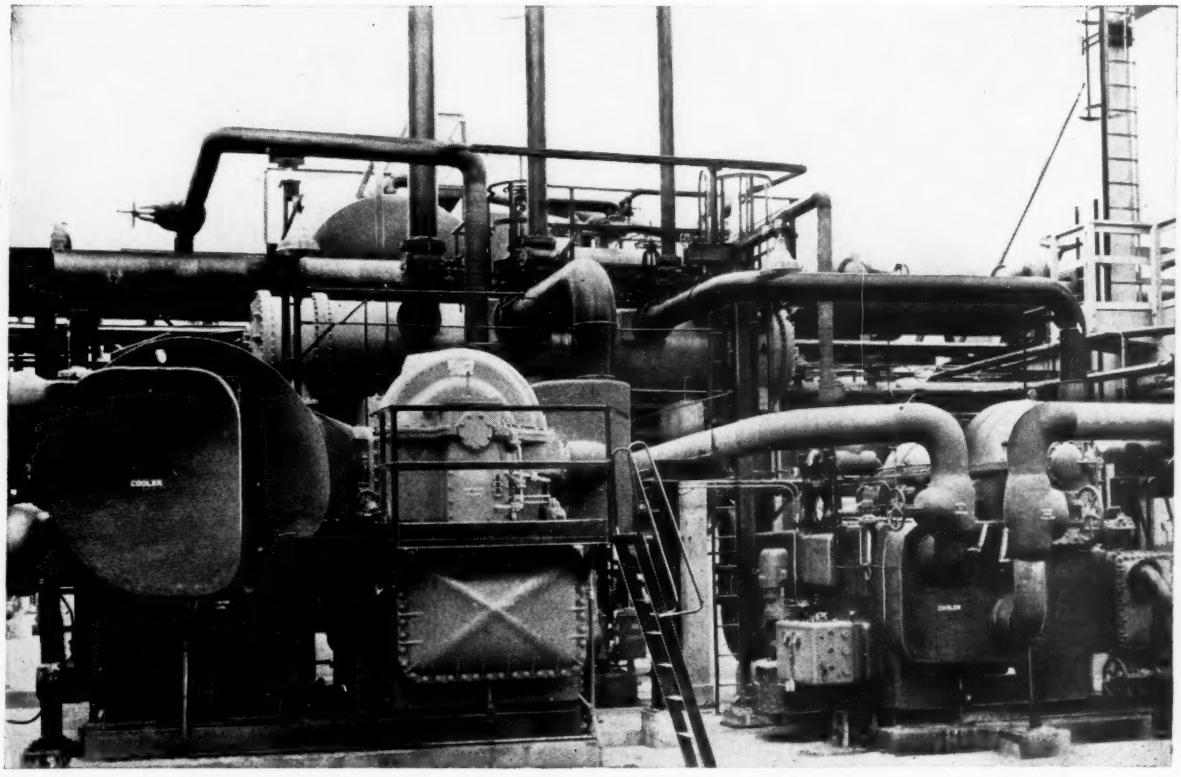
PROBLEM: To control selective absorption in segregation of butadiene in synthetic rubber production



SOLUTION: Controlling the temperature of chemical reaction in a mixture of hydrocarbons and solvent

THE PROCESS of manufacturing butadiene is a matter of processing gases through superheat, cooling and pressure. The cooling stage was a problem in refrigeration that had to be solved with engineering thoroughness by companies embarking on synthetic rubber production — and solved quickly to meet urgent demands of the armed forces.

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Solving it quickly was a separate problem and many synthetic rubber producers made arrangements to obtain existing Carrier Centrifugal refrigerating machines from owners not using them in vital war work.

The gigantic plant of the Neches Butane Products Company of Port Neches, Texas, for example, required four Carrier Centrifugal machines totaling nearly 2000 tons cooling capacity. Patriotic owners voluntarily relinquished them to speed completion of the plant. Three of the machines came from department stores—Gimbel Brothers, New York City; G. Fox, Hartford, Conn., and Mandel Bros., Chicago. The fourth came from the Civic Auditorium, New Orleans.

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July, 1944

Volume 110 Number 4

A Bill Brothers Publication

INDIA
RUBBER WORLD
NATURAL & SYNTHETIC

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Volume 110 **New York, July, 1944** **Number 4**

Further Studies on the Effect of Temperature on the Resilience of Natural and Synthetic Rubber—I

H. C. Jones[1] and E. G. Snyder[1]

WHEN pale crepe and smoked sheets were essentially the only forms of rubber available, rebound determinations at room temperature were considered a sufficient evaluation of resilience by most rubber technologists. This situation existed because the resilience of natural rubber changed only to a slight extent with variations in temperature, and it was recognized that a determination of resilience at room temperature could be taken as a fair criterion of the resilience of the compound over a reasonably wide temperature range. This laboratory reported work on synthetic elastomers over a year ago,[2] indicating that a determination of resilience at a single temperature was not adequate for synthetic rubber since some of these materials exhibit a considerable thermo-resilience effect, that is, resilience changed rather markedly with temperature. A large number of laboratories, particularly those interested in the high temperature performance of synthetic elastomers, are now reporting determinations made at room temperature and 100° C. Cole[3] and Sebrell[4] have published data showing the influence of temperature on the resilience of synthetic elastomers. Some synthetic elastomers have a resilience that approaches natural rubber at elevated temperatures, but are stiff and loggy and exhibit poor resilience properties at low temperatures. Therefore in the case of synthetic rubber it is much more important to consider the temperatures involved in the performance and service life of the rubber article that is subjected to flexing than in the case of natural rubber. The measurements reported in this paper were made with a Goodyear-Healey-type pendulum[5] modified so that the resilience determinations could be made over a range of temperatures.

Resilience Measurements on Various Elastomers

Several elastomers compounded with 25 volumes of zinc oxide were tested on the pendulum over a range of temperatures from 0 to 100° C., and the results for Neoprene GN, "Thiokol" N, Hycar OS-30, and pale crepe are shown in Figure 1. The resilience of Neoprene GN was significantly lower than natural rubber in the range from room temperature to 100° C.; below room temperature the resilience of neoprene decreased at a greater rate than that of pale crepe. Neoprene GN had a higher resilience than Hycar OS-30 and "Thiokol" N, and the resilience of the sulphur-bearing elastomer was relatively lower over the entire temperature range. The temperature resilience characteristics of Neoprene GN more nearly approach that of natural rubber than any of the other polymers examined.

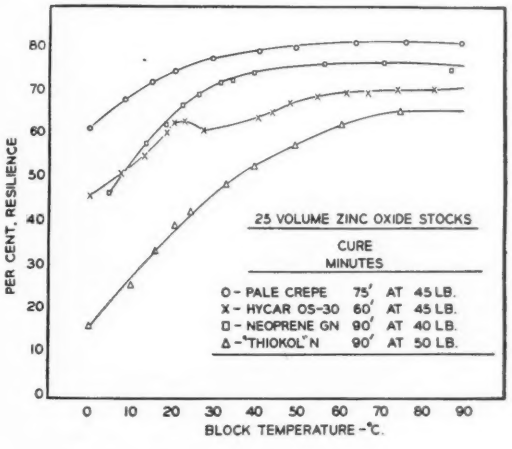


Fig. 1. Temperature-Resilience Measurements on Several Elastomers

The resilience of the butadiene-acrylonitrile elastomers, Hycar OR-15 and Hycar OR-25, over the temperature range of 0 to 100° C. is shown in Figure 2. Hycar OR-25

[1] Development engineering division, technical department, New Jersey Zinc Co. (of Pa.), Palmerton, Pa.
[2] INDIA RUBBER WORLD, 108, 137 (1943).
[3] *Trans. Am. Soc. Mech. Engrs.*, 65, 15 (1943).
[4] Goodyear Memorial Lecture, *Ind. Eng. Chem.*, 35, 736-50 (1943).
[5] Jones and Pearce, "Proceedings of the Rubber Technology Conference, London, 1938." W. Heffer & Sons, Ltd., Cambridge, England. P. 830.

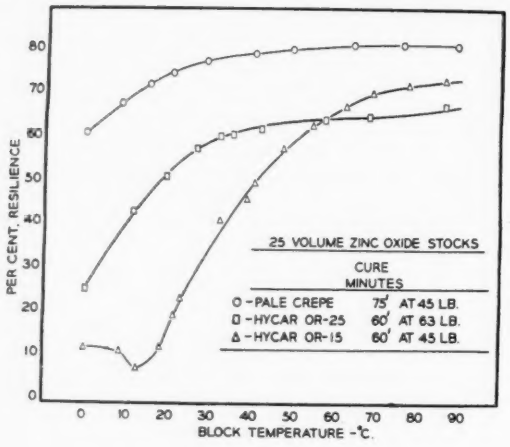

PER CENT. RESILIENCE
BLOCK TEMPERATURE -°C.
25 VOLUME ZINC OXIDE STOCKS
CURE MINUTES
O -PALE CREPE 75' AT 45 LB.
□ -HYCAR OR-25 60' AT 63 LB.
Δ -HYCAR OR-15 60' AT 45 LB.

Fig. 2. Temperature-Resilience Measurements on Hycar OR-15 and Hycar OR-25

is understood to be similar to Hycar OR-15 except for a higher butadiene content, and this is reflected in the more uniform resilience over the temperature range. The temperature sensitivity of the acrylonitrile portion of the polymer is apparent in the Hycar OR-15 results. Below 60° C., Hycar OR-15 has a lower resilience and above this temperature a higher resilience than Hycar OR-25. These observations confirm the previously reported data[2] that

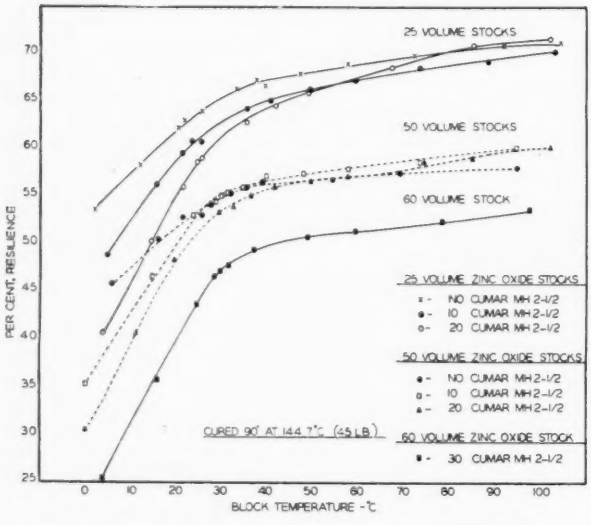

PER CENT. RESILIENCE
BLOCK TEMPERATURE -°C
25 VOLUME STOCKS
50 VOLUME STOCKS
60 VOLUME STOCK
25 VOLUME ZINC OXIDE STOCKS
x - NO CUMAR MH 2-1/2
● - 10 CUMAR MH 2-1/2
o - 20 CUMAR MH 2-1/2
50 VOLUME ZINC OXIDE STOCKS
● - NO CUMAR MH 2-1/2
□ - 10 CUMAR MH 2-1/2
▲ - 20 CUMAR MH 2-1/2
CURED 90' AT 144.7°C (45 LB.)
60 VOLUME ZINC OXIDE STOCK
● - 30 CUMAR MH 2-1/2

Fig. 3. Temperature-Resilience Measurements on GS-S Stocks

polymers high in butadiene content exhibit a minimum change in resilience over the temperature range of 0 to 100° C. When a portion of the butadiene is replaced with acrylonitrile or styrene, the low-temperature resilience properties are impaired. However acrylonitrile definitely contributes to improved resilience at elevated temperatures.

The Effect of Plasticizers in GR-S

The function of plasticizers in natural rubber is primarily that of a softening agent; while in GR-S some plasticizers have a profound influence on physical properties. In Figure 3 are plotted curves for GR-S compounds with 25, 50, and 60 volumes of zinc oxide and 10, 20, and 30 parts of the high melting point coumarone-indene resin, Cumar MH2-½. In the temperature range below 60° C., Cumar MH2-½ degraded resilience, and 20 parts was more effective than 10 parts of the resin. However at 80 to 100° C. the resilience of the stock with 20 parts of Cumar MH2-½ was measurably better than the stocks with less of the coumarone-indene resin. Similar results were observed with 25 and 50 volumes of zinc oxide in the compounds; Cumar MH2-½ had an adverse effect on low-temperature resilience; while at elevated temperature (70-100° C.) the resin favorably influenced resilience properties. The 60-volume compound with 30 parts of Cumar MH2-½ had somewhat poorer pendulum rebound values

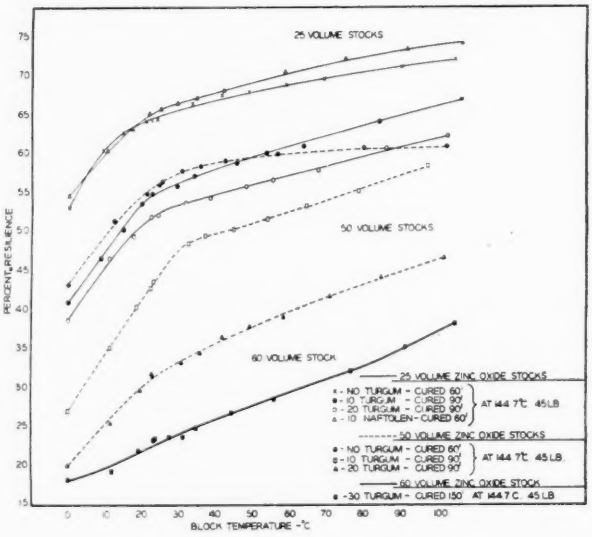

PERCENT RESILIENCE
BLOCK TEMPERATURE -°C
25 VOLUME STOCKS
50 VOLUME STOCKS
60 VOLUME STOCK
25 VOLUME ZINC OXIDE STOCKS
x - NO TURGUM - CURED 60'
● - 10 TURGUM - CURED 90'
o - 20 TURGUM - CURED 90'
▲ - 10 NAFTOLEN - CURED 60'
AT 144.7°C. 45 LB.
50 VOLUME ZINC OXIDE STOCKS
● - NO TURGUM - CURED 60'
□ - 10 TURGUM - CURED 90'
▲ - 20 TURGUM - CURED 90'
AT 144.7°C. 45 LB.
60 VOLUME ZINC OXIDE STOCK
● - 30 TURGUM - CURED 150' AT 144.7 C. 45 LB.

Fig. 4. Temperature-Resilience Measurements on GR-S Stocks

over the temperature range than the stocks compounded with 25 and 50 volumes of zinc oxide. All the stocks were well cured to eliminate the effect of cure on resilience. It was observed in the earlier work[1] and confirmed in the present investigation that resilience does not vary with time of vulcanization beyond the optimum cure.

Turgum, a turpentine gum, has been compounded in GR-S with 25, 50, and 60 volumes of zinc oxide, and the results are plotted in Figure 4. Ten and 20 parts of Turgum were added to the 25-and 50-volume stocks, and 30 parts of the resin added to the 60-volume compound. A

(Continued on page 415)

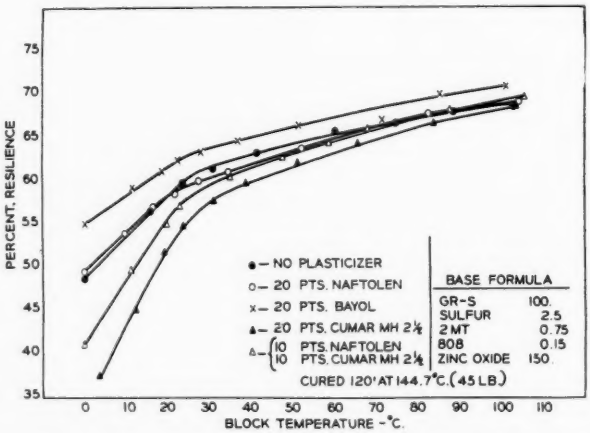


Fig. 5. Temperature-Resilience Measurements on GR-S Stocks

Nickel Alloy Insures Improved Roll-Neck Bearing Performance

H. M. Donepp[1]

IT IS the purpose of this article to record certain advances in non-ferrous metallurgy that have permitted the perfection of an alloy having the necessary properties to fill the need of a bearing medium which may be applied to existing equipment or incorporated in new equipment in factories making rubber articles vital to the civilian and military prosecution of the war. The extreme operating conditions met in rubber processing equipment—especially refiners, crackers, extruders, and internal mixers—have been aggravated by the necessity of changing from natural rubber to synthetic rubbers, which require higher roll pressures and about 20 to 30% more milling time, and the use of thermoplastics requiring roll temperatures as high as 350° to 400° F. Further, the demands of war are such that what was normal production with natural rubber is now required to be exceeded, not merely equalled, by production with GR-S and other synthetic stocks. In addition this has to be done mostly with existing equipment as new equipment is necessarily slow in coming, especially if it is felt that standard designs are not suitable.

As a result of work started several years ago a nickel alloy having all the necessary properties to fill the need has been developed, and after more than 12 years' experience with it in the rubber industry, it is possible to set forth practical, workable, and simple field-tested applications for the new alloy at this time when the need is most urgent.

Two events happening almost concurrently, however, made its use in these applications not merely desirable, but imperative. One was the rapid rise of the plastics industry, and the other, less happy, was the rising tide of Japanese aggression which cut us off from our chief sources of crude rubber. Manufacturers and processors of thermoplastics have to use heated rolls in their work. Temperatures used are as high as 350-400° F. A great deal of this heat is necessarily transmitted to the roll-neck and so to the bearing. Tuftin's low coefficient of expansion, ability to "hang on" to a film of lubrication and to retain its original Brinell hardness in the face of elevated temperatures made it possible to run these mills efficiently and without risk of scoring or marking the roll-neck in any way.

Japanese control of our crude rubber supply switched us rapidly to synthetics, most commercial types of which require higher roll pressures and about 20-30% more milling time to process into sheet, etc. Where it is feasible to increase mill speeds to recover this additional milling time and thus raise output, Tuftin makes it possible with a minimum of effort and with no changes in design or increase in power necessary.

Consequently its use by rubber machinery manufacturers has become virtually axiomatic as they have always been eager to improve the performance and efficiency of their mills and other equipment on a sound basis and are constantly desirous of anticipating the requirements of their clients. These tendencies, always present and active, were never more vividly exemplified than by the extensive use of Tuftin in the equipment being made now under the rubber industry's $70,000,000 expansion program for the production of tires.

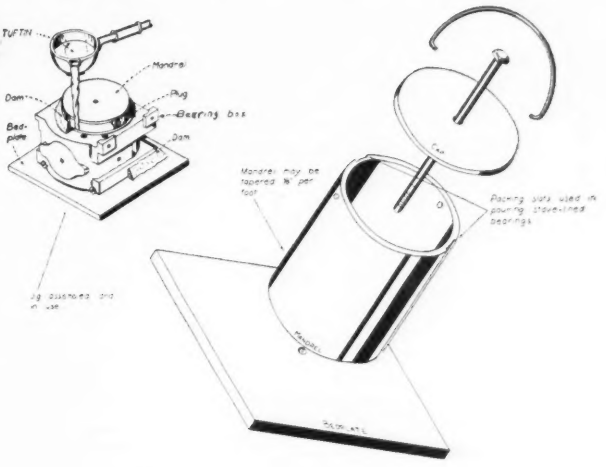


Fig. 1. Simple Jig for Pouring Roll-Neck Bearings with Tuftin No. 73 Nickel Alloy[2]

The Requirement and the Solution

In order to overcome the extreme bearing conditions encountered in operating rubber and plastics processing machinery, the ideal bearing medium must have the following properties and characteristics to a maximum degree:

1. Ability to withstand very heavy, sustained pressures.
2. Ability to function perfectly at high speeds—low coefficient of friction.
3. Ability to retain original Brinell hardness in the face of high running temperatures, thus wearing longer.
4. Ability to "hang on" to lubrication film, either grease or oil, under heavy, steady pressures—positive surface capillary action.
5. Ability to form a perfect bond with the bearing housing to insure a tight, durable liner.
6. Ability to resist cracking-out or extruding under impact loads—high tensile strength.
7. Ability to sustain adverse operating conditions or abuse (such as lubrication failure) without scoring, seizing, or marring the journal or roll-neck.
8. Ability to be poured and handled in the factory's own shop by already known and accepted methods, thus facilitating quick repairs and changeovers.
9. Ability to be recovered completely and reused for the same purpose.
10. Ability to be obtained readily at low, overall initial cost.
11. Ability to be used on all existing equipment without having to change design.

Even a casual examination of the list reveals that bronze or "brasses," until comparatively recently the most universally accepted bearing metal for this work, fall far short of being "ideal." Some of these qualities it does not possess at all (i.e., bondability, non-scoring characteristics, pourability, able to be handled in the factory's own shop, reusability) and the others only to a limited degree. Obviously, then, the approach to the ideal medium could not be through bronze, since its drawbacks were inherent and not surmountable by varying the method of casting or by altering the composition or by a combination of both.

[1] Chief metallurgist, Jackson-Wheeler Metals Service, Inc., Brooklyn, N. Y.
[2] Registered United States Patent Office.

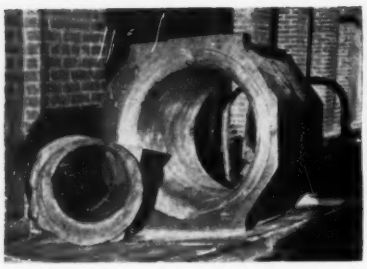


Fig. 2. Roll-Neck Bearings Lined with Tuftin No. 73 Nickel Alloy

Fig. 3. Nineteen-Inch Diameter Primary Cracker Roll-Neck Bearing Lined with Tuftin No. 73 Nickel Alloy, Showing Bored Relief and Concentric Oil Grooves for Lubrication

Briefly, the desired result was achieved by mounting, in a homogeneous dispersal under a crucible method employing rigid thermal and atmospheric control, pure nickel and cadmium in an especially designed and balanced nonferrous eutectic. The resulting alloy has, by both laboratory and extensive field-usage determination, all of the foregoing properties to the optimum degree. It has been designated as Tuftin No. 73 Nickel Alloy.[2]

The Uses and Application

USES. Since this alloy was originally developed at the request of, and in direct cooperation with, a large reclaimer, it found its first and widest use in the roll-neck bearings of refiners and crackers in place of bronze, fiber and anti-friction bearings which had been tried previously with dubious success. Inasmuch as it "filled the bill" perfectly in all particulars in these, the severest bearing applications in the rubber industry, its use immediately spread to the roll-neck bearings of sheeters, washers, calenders, internal mixers, and to the marine-type thrust bearings of tubers, strainers, and extruders. Subsequently it found equal favor for the sleeve bearings on speed reducers, motors, tire rim rolling mills, and for the roll-neck bearings on artificial leather embossing mills and calenders.

APPLICATION. As has been stated, this special bearing alloy can be poured and handled in the machine shop of the plant with its regular crew exactly like any high-grade Babbitt metal. A review of this simple procedure follows:

1. Tuftin No. 73 Nickel Alloy pours at about 850° F.—hot enough to "char" a white pine stick; therefore no pyrometer or other special equipment is needed.

2. The bearing box and mandrel are to be cleaned and made free of moisture, grease, dirt, etc.

3. Both bearing box and mandrel should be heated to about 250-300° F. to insure a perfect bond of alloy to housing. Also, in the case of stave lined boxes, the shrinkage of the bearing box on cooling gives a snug end fit.

4. Use only a clean pot and ladle so that the alloy will not be contaminated by metals which have been previously melted and poured.

The jig illustrated in Figure 1 offers advantages of simplicity, adaptability, durability, and low cost. It can be made from materials readily found in any shop; it can be used, with a set of mandrels of different diameters, to pour the complete range of bearing sizes in the plant, both full circle and stave lined; and will last indefinitely if given reasonable care.

As powerful testimony to the ease and flexibility of handling of Tuftin, refer to the larger of the two bearings pictured in Figure 2. This is one of four bearings, 19 inches in diameter, on one of the largest primary cracker mills in the United States. Originally full-circle bronze lined, it could not be made to run cool for any length of time until it was converted to Tuftin. This change was made simply by removing one-half of the bronze on the pressure side, securing the remaining one-half on the off side to the bearing box, and then pouring Tuftin into the area formerly occupied by the bronze on the pressure side. This procedure was eventually followed on all four of the bearings on this mill. (While the smaller bearing shown in the same picture was used merely for purposes of contrast, it is interesting to note that it is obviously from a mill of ancient vintage, has no water jacket, and offers but a small area for sustaining the load. These defects were completely compensated for when it was lined with Tuftin.)

No discussion of the uses and application of Tuftin is complete without mention of lubrication. The physical structure of the alloy, brought about metallurgically, enables it to establish on the bearing surface a positive capillary action which serves to retain the lubrication film and to resist the wiping action of the journal or roll-neck. Consequently it works equally well with either grease or oil and any standard system of grooving or of introducing the lubricant into the bearing will suffice. For those mechanics, however, who have yet to find a system which will satisfy the total range of bearing applications in the plant we offer one which has proved wholly successful wherever tried.

Every bearing has a pressure and an "off" side, and this point is especially true of roll-neck bearings. It is desirable, therefore, to introduce the lubricant to the bearing from the off side and to provide from that point a positive system within the bearing for transferring the lubricant to the pressure side. This system can easily be provided by boring a relief on the off side of the bearing, starting at the point where the lubricant enters and terminating in a feather edge at the point where the pressure area begins, as shown in Figure 3. To prevent the lubricant from being pushed out of the ends of the bearing when the pressure

(*Continued on page 415*)

Fig. 4. Simple Grease Cup Used for Lubricating Refiner Mill Bearing Lined with Tuftin No. 73 Nickel Alloy

The Heat Problem in GR-S Carcass Stocks[1]

John G. Hendricks[2]

THE most serious problem in the compounding of GR-S is the development of satisfactory GR-S tires—particularly truck tires. There are many individual phases involved in this problem and the most important factor that must be considered—one that enters most of the various phases—is heat.

Heat is generated in the tire as it is subjected to load and to continuous flexure while in use. The amount of heat generated by GR-S stocks is considerably greater than that generated by the corresponding natural rubber compounds. The effect of this heat on GR-S stocks is usually to promote a rapid and non-reversible shift from a rubbery, elastic material to a stiff, brittle substance. As a result, elongation, modulus, flex-crack resistance, tear resistance, and other properties suffer.

Problem Reviewed and Hypothesis Proposed

Unfortunately heat build-up and heat stability cannot be treated as independent problems in tire compounding. GR-S may be so compounded as to offer satisfactory resistance to heat[3, 4], but the methods used are usually almost diametrically opposed to known procedures for obtaining low heat build-up. Low heat build-up is as essential as heat stability because of the danger of degrading the cord fabric.

The general manner by which these characteristics are usually imparted to GR-S tire compounds is: for low heat build-up, the use of high sulphur and high acceleration; and for practical heat stability, the use of relatively fast, efficient acceleration with low (available) sulphur. Extent and type of pigment loading are important factors in the former, and certain non-sulphur vulcanizing agents are also effective with the latter.

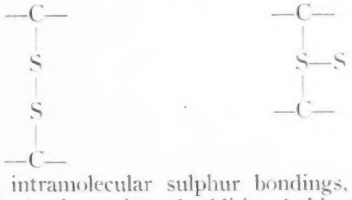
Detailed examination of these methods shows there is one point common to both general procedures. Both heat stability and low heat build-up are most readily obtained when the compound is tightly cured. This seems to indicate that a heat stable vulcanizate at a relatively high state of cure would be most effective in solving heat problem for GR-S carcass stocks.

It is convenient to describe a problem such as this in terms of the molecular structures involved and their relation to the physical properties of the vulcanizate. Low heat build-up requires a relatively large number of linkages between the flexible polymer chains which improves elastic strength and stiffness and also imparts a more ordered relation of chain segments relative to one another. Increasing the number of such links beyond what would correspond to a tight cure, however, would not aid materially in reducing heat build-up. Such an increase in the rigidity of the network does impose several drastic limitations. Not only is extensibility greatly reduced, but, because of the slow relaxation rate of GR-S,[5] nearly the full strength of the vulcanizate is exerted on any nick or imperfection, even under moderate deformation. The crux of the problem lies in the fact that when sufficient sulphur is incorporated in the usual GR-S stock to allow formation of the desired amount of cross-linkage in a practical curing time, many additional linkages usually form on further exposure to heat.

The following pertinent observations therefore lead to a working hypothesis which is believed to account in a general way for this phenomenon. It has been recognized that GR-S stocks have a considerably lower rate of cure than the equivalent natural rubber compounds. In addition to this, it is often observed that the lower cures of GR-S do not seem to be so tightly cured as the combined sulphur would indicate.

Recently considerable attention has been focused upon the "continued vulcanization" exhibited by GR-S stocks containing persistent accelerators.[6] It has been shown previously[4] that the "marching modulus" and poor heat resistance ascribed to these catalytic accelerators are greatly reduced when they are used in an active and effective accelerator combination with low sulphur.

It is evident from recent data[7] that more than one type of sulphur linkage may occur during vulcanization. Examination of the different more probable[7, 8, 9] type of linkages leads to the conclusion that in general these different linkages would contribute very differently to the physical properties of the vulcanizate, particularly on the basis of combined sulphur. Furthermore such linkages would differ considerably in stability.[9] As a consequence of this, subsequent action of heat and accelerator could lead to rearrangement of the less stable bondings into additional linkages of a more stable—and stiffening—nature. For example, intermolecular linkages as



or possibly, intramolecular sulphur bondings, might rearrange with the formation of additional thioether

linkages.

It is believed that thermodynamic and, to some extent, steric factors result in a relatively greater portion of sulphur combining initially in a less stable form in GR-S. More efficient and powerful acceleration would be expected to direct toward the more stable linkage or linkages. With ordinary, less efficient acceleration, more sulphur and accelerator are used in GR-S than otherwise would be the case. Because of this, appreciable amounts of sulphur are available for rearrangement or combination on exposure to heat. The result is brittleness.

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[1] Paper presented at meeting of New York Rubber Group on May 26 at Building Trades Club, New York, N. Y.

[2] National Lead Research Laboratories, 105 York St., Brooklyn 1, N. Y.

[3] B. M. Sturgis, A. A. Baum, and J. R. Vincent, *Ind. Eng. Chem.*, 36, 348 (1944).

G. M. Wolf, T. E. Deger, H. I. Cramer, and C. C. de Hilster, "Alkyl Phenol Sulphides as a Class of Vulcanizing Agents." Paper presented before the Spring Meeting of the Division of Rubber Chemistry, A. C. S., New York, N. Y., 1944.

[4] J. G. Hendricks, *Rubber Age (N. Y.)*, 54, 521 (1944).

[5] H. A. Braendle and W. B. Wiegand, *J. Applied Phys.*, Apr., 1944.

[6] A. E. Juve, and B. S. Garvey, Jr., *Ind. Eng. Chem.*, 36, 212 (1944).

G. M. Massie and A. E. Warner, "Heat Aging of GR-S Stocks." Paper presented before Spring Meeting, Division of Rubber Chemistry, A. C. S., New York, N. Y., 1944.

[7] M. L. Selker and A. R. Kemp, *Ind. Eng. Chem.*, 36, 16 (1944).

R. T. Armstrong, J. R. Little, and K. W. Doak, "Chemistry of Sulphur Vulcanization." Paper presented before the Spring Meeting of Division of Rubber Chemistry, A. C. S., New York, N. Y., 1944.

[8] G. J. Van Amerongen, and R. Houwink, *Rubber Chem. Tech.*, 16, 834 (1943).

[9] E. A. Hauser, and M. C. Sze, *J. Phys. Chem.*, 46, 118 (1942).

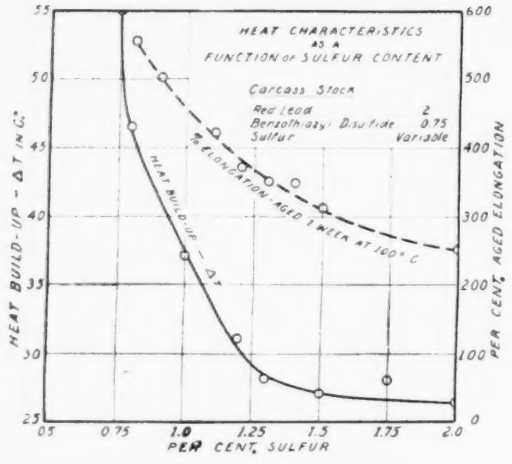

Fig. 1. Heat Build-up and Heat Stability of Red Lead-Altax Combination

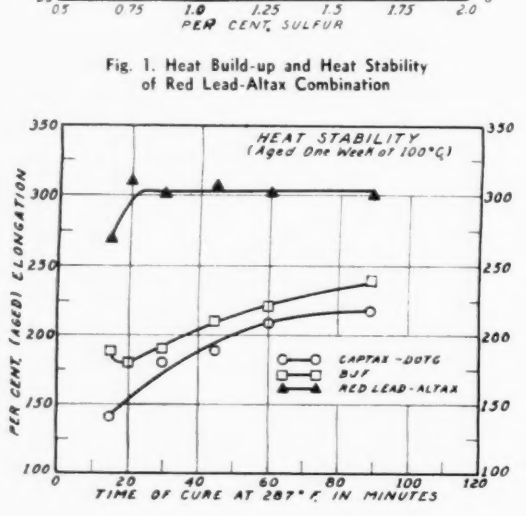

Fig. 3. Heat Stability

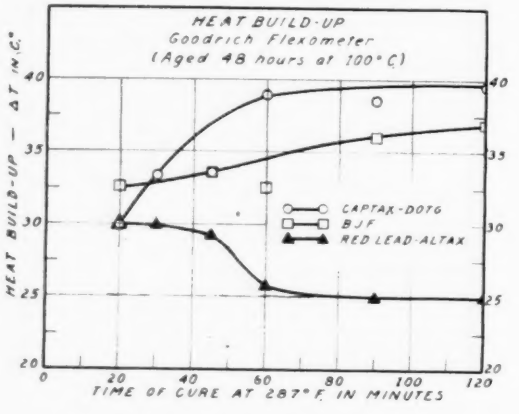
HEAT BUILD-UP
Goodrich Flexometer
(Aged 48 hours at 100° C)
CAPTAX - DOTG
BJF
RED LEAD - ALTAX
HEAT BUILD-UP — ΔT IN C°
TIME OF CURE AT 287° F. IN MINUTES

Fig. 5. Reduction of Heat, after Aging Two Days

Experimental Work

If heat stability and low heat build-up are to be obtained concurrently, it is apparent—whatever the mechanism involved—that active and efficient acceleration is indicated. In the present work it was found that proper combination of red lead,[10] benzothiazyl disulphide, and

[10] Litharge as an activator is comparable in effectiveness to red lead for most practical purposes, but red lead shows definite superiority where both heat stability and heat build-up are critical.

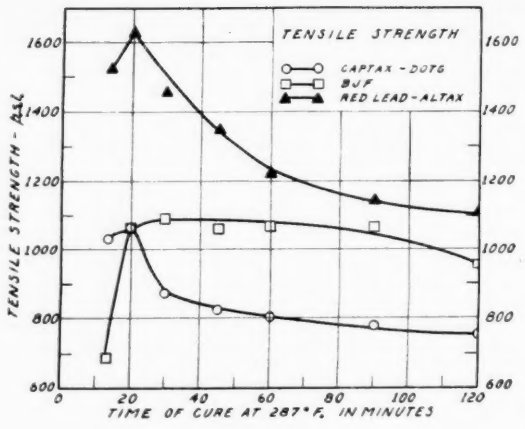

Fig. 2. Time-Tensile Strength Curves

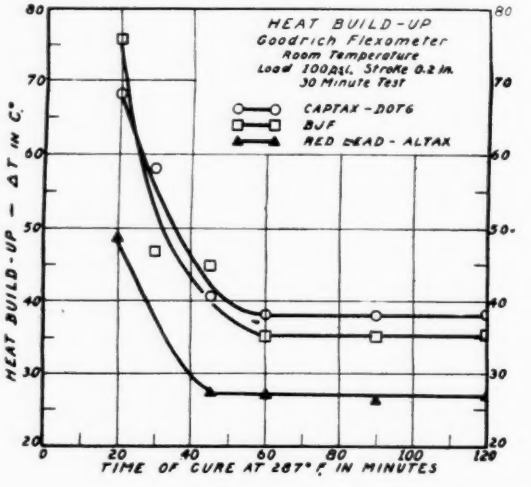

Fig. 4. Reduction of Heat Build-up by Red Lead-Altax Compound

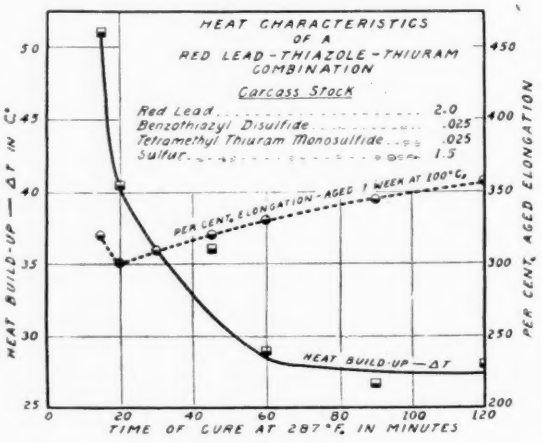
HEAT CHARACTERISTICS
OF A
RED LEAD - THIAZOLE - THIURAM
COMBINATION
Carcass Stock
Red Lead 2.0
Benzothiazyl Disulfide .025
Tetramethyl Thiuram Monosulfide .025
Sulfur 1.5
PER CENT. ELONGATION - AGED 1 WEEK AT 100° C
HEAT BUILD-UP — ΔT
HEAT BUILD-UP — ΔT IN C°
PER CENT. AGED ELONGATION
TIME OF CURE AT 287° F. IN MINUTES

Fig. 6. Heat Characteristics of Red Lead-Altax-Thionex Compound

sulphur resulted in improvement of both heat stability and heat build-up. In carcass stocks, where both heat stability and heat build-up are of paramount importance, a combination of 2.0 parts red lead and 0.75-part ben-

zothiazyl disulphide, used with about 1.5 parts sulphur was found particularly effective.

Table 1 shows the type of compound used in this work.

TABLE 1

GR-S (Institute)	100	
S.R.F. black	30	
Zinc oxide	3.0	
#2 RM red lead	2.0	
Benzothiazyl disulphide	0.75	
Sulphur	(1.5)	(Var)
Paraflux	7.5	

Conclusions are based upon the actions of the variables in the base. The amount and type of loading have considerable influence on heat build-up, and these factors have been the subject of investigation.[11] For the present purposes the loading indicated was arbitrarily chosen as representative.

Figure 1 shows the heat build-up and the heat stability of the red lead-Altax combination as a function of sulphur content. The abrupt change of slope in the heat build-up curve at about 1.25%[12] sulphur shows that in this compound additional sulphur does not aid materially in reducing heat build-up. Any additional sulphur, however, would be detrimental to heat stability, as is shown by the aged elongation curve. The graph indicates that 1.25 to 1.5% sulphur is a proper range for this combination in a carcass compound. As a practical measure, 1.5% sulphur was selected for discussion.

For a proper evaluation of the red lead-Altax combination it was necessary to compare it with blanks representative of the most effective acceleration available at the time of the present study. Table 2 shows these compounds.

TABLE 2

	A	B (Blank)	C (Blank)
GR-S (Institute)	100	100	100
SRF black	30	30	30
Zinc oxide	3	3	3
Paraflux	7.5	7.5	7.5
Sulphur	1.5	2.0	2.5
Altax	0.75	...	...
Captax	...	1.25	...
BJF	...	...	0.9
Red lead	2.0	...	...
DOTG	...	0.1	...

Figure 2 shows the time-tensile strength relation of the red lead-Altax compound as compared with the blanks.

Figure 3 illustrates the relative heat stability of the three combinations. The elongation after one-week exposure to air at 100° C is taken as a criterion of heat resistance. Modulus, tear resistance, and other critical properties would show similar changes.

A comparison of the heat generated by the red lead-Altax compound and the blanks is shown in Figure 4. This graph indicates that the red lead-Altax combination is effective in reducing heat build-up.

The effectiveness of this combination is again evident in Figure 5, which shows the same compounds after aging two days at 100° C.

The characteristics of the red lead-Altax compound may be modified by the use of other types of accelerators. Figure 6 illustrates this point and shows the heat characteristics of a carcass compound containing 2.0 parts of red lead, 0.25-part Altax, 0.25-part Thionex, with 1.5% sulphur. It may be seen that this combination also imparts improved heat resistance and heat build-up.

In Figure 3, and in comparing Figures 4 and 5, we find that a familiar phenomenon has taken place in the case of the blanks. The greatest loss in elongation has taken place in the earlier cures. More correctly, there

[11] H. C. Jones, "Reenforcement of GR-S with Zinc Oxide." Paper presented before the Spring Meeting of the Division of Rubber Chemistry, A. C. S., New York, N. Y., 1944.

[12] The exact point at which this change of slope occurs may vary slightly depending on the source of GR-S; 1.5% sulphur is recommended as allowing a factor of safety. It does not follow that additional allowance would improve this factor.

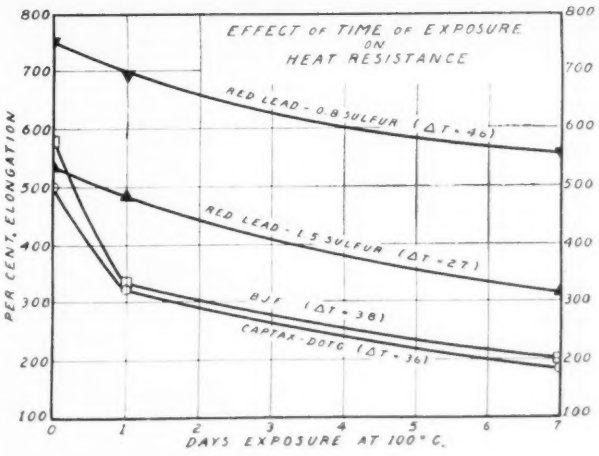

Fig. 7. Heat Stability vs. Time of Exposure

is least drop in elongation on the long cures. The situation is similar in the heat build-up curves. In the blanks, those cures that originally indicated greatest heat build-up in Figure 4 are the coolest running cures of the blanks after heat aging, as shown in Figure 5. Note, however, that the plateau sections of the curves remain virtually unchanged.

It is believed that these observations point to a fallacy in present carcass compounding. Compounds accelerated in the manner used for the blanks give a choice of either fairly low heat build-up and poor stability, or increased heat build-up with fair heat stability. Actually, in the curing curves of the blanks, the points which indicate optimum properties for either of these characteristics are those which indicate less satisfactory results with respect to the other.

A comparison of the best characteristics of the blanks with those imparted by the red lead-Altax combination is of interest. In the latter case the time-tensile strength relation may be used much more reliably as an indication of state of cure. Once optimum cure is reached, the data show the elongation for any given aging period to be remarkably constant. Since the plateau sections of the time-heat stability and time-heat build-up curves are both reached in a practical time, there is little of the conflict noted above.

The difference between the red lead-Altax compound and the blanks is readily explainable on the basis that a powerful and efficient accelerator combination is necessary to drive home the sulphur.

Figure 7 shows the heat stability of red lead-Altax compounds and the blanks as a function of time of exposure. The relations shown in the three lower curves already have been discussed. In order to demonstrate the adaptability of the red lead-Altax combination, it is shown in a compound containing 0.8% sulphur, as well as one with 1½% sulphur. The results shown by the two upper curves indicate that the use of this accelerator combination permits considerable latitude in selection of physical properties by proper adjustment of the sulphur content.

Summary

A working hypothesis is presented to account for the action of heat on GR-S vulcanizates. It is proposed that an appreciable amount of sulphur combining in early stages combines in an unstable form. Subsequent action of heat leads to rearrangement and combination to additional intermolecular bondings.

(*Continued on page 457*)

Flex-Cracking Resistance Tests on the De Mattia Machine

H. F. Schwarz[1]

WHEN it became apparent to the rubber chemists of this country that a major defect of GR-S was relatively poor resistance to flex-cracking, there was an immediate response in the form of experimentation with laboratory test machines to determine the factors involved and to devise methods of overcoming failures due to flexing.

At the time that work was started on the flexing properties of GR-S, there were in general use two standard testing machines for determining the relative resistance to growth of flex cracks: (a) The De Mattia flexing machine,[2] and (b) the du Pont flexing machine.[3] These machines, which had been approved by the American Society for Testing Materials,[4] had been developed to test compounds containing natural rubber to be used in a wide variety of products including shoe soles and uppers, belts, diaphragms, and hose covers, as well as tire treads and sidewalls. Neither machine, therefore, could be expected to be the ideal type desired for experimentation with GR-S tire tread stock.

Vila,[5] Breckley,[6] and Carlton and Reinbold[7] have made valuable suggestions about the methods of testing GR-S tread stock on the above machines. All have pointed out the advisability of making a nick in the sample at the beginning of the test and measuring the growth of the crack during flexing. However little has been said about the other conditions of testing, such as the angle through which flexing takes place on the De Mattia machine. The work reported here was done to obtain information on the effect of variation in the angle of flexing.

Recent publications by Prettyman,[8] Fielding,[9] and Columbian Carbon Co.[10] have described improved testing machines which seem to have advantages over the De Mattia machine. The Prettyman machine, since it was designed to duplicate as nearly as possible the forces acting on the grooved section of a tire tread, seems to be particularly well adapted to laboratory tests which are intended to serve as an indication of the resistance of a tire tread to flex cracking. However until one of these newly developed machines is adopted as a standard for tire tread flexing tests, it should be to the interests of those using equipment already available to determine the best conditions under which tests should be made.

Method of Testing

The following basic formula for GR-S tire tread stock was used in this experiment:

	Parts by Weight
GR-S	100.
Zinc Oxide	5.
Stearic Acid	2.
Mercaptobenzothiazole	1.5
Sulphur	2.
Witco #12 Channel Black	Varied
Witco #38 M. R.	Varied

The variation in the last two ingredients follows:

Witco #12 Channel Black	50, 60, and 75
Witco #38 M. R.	0, 10, 30, and 50

The Witco No. 12 channel black is of the easy-processing or coarse channel-black type.

The Witco No. 38 M. R. has the following physical properties:

Melting Point (cube in air method)	300° to 320° F.
Penetration (A.S.T.M. D-5-25):	
At 77° F.	3 to 5
32° F.	2 to 3
115° F.	5 to 7
Specific Gravity	1.03

The size of the batch mixed was 3.4 times the above formula in grams. A 12-inch laboratory mill was used, and the temperature was maintained at 80° to 100° F. After all ingredients were incorporated into the GR-S, the batch was refined four times.

All tests were made according to the standard A.S.T.M. methods.

The effect on tensile strength, modulus at 300 per cent, elongation, and tear resistance caused by variation in the loading of channel black and M. R. is given in Table 1 and Figures 1, 2, 3, and 4.

TABLE 1

Parts Channel Black per 100 Parts GR-S	Parts M. R. per 100 Parts GR-S			
	0	10	30	50
Tensile Strength (Lb./Sq. In.)				
50	2860	3110	2600	1820
60	2960	3140	2700	2050
75	3030	3160	2770	2150
Modulus at 300% Elongation (Lbs./Sq. In.)				
	0	10	30	50
50	1630	820	420	250
60	2300	1080	500	300
75	....	1680	720	400
Elongation (%)				
	0	10	30	50
50	430	600	830	890
60	340	550	780	860
75	270	480	720	800
Tear Resistance (Lbs./In. of Thickness)				
	0	10	30	50
50	205	280	263	175
60	227	307	315	210
75	237	325	357	290

Testing of Flex Crack Resistance

The De Mattia type of machine used in flex cracking tests was the National Rubber Machinery Co. Model D. The "bend flexing test specimens" described in the A.S.T.M. method, Designation D-430-40-B, were used.

Since Vila, Breckley, Carlton and Reinbold, and Prettyman have agreed as to the desirability of using a nicked sample, that procedure was followed. The nick was made directly in the center of the groove of the specimen with the corner of a single edge razor blade, by the following method:

> The specimens were mounted in the machine, and it was rotated by hand to that position in which the jaws were closest together. This "opened up" the grooves of the specimens and made it easier to control the size and location of the nick. The nick was made exactly 0.2-centimeter long by merely touching the corner of the razor blade to the exposed surface.

[1] Formerly with Witco Chemical Co., present address, Sherwin-Williams Co., both in Chicago, Ill.

[2] Cooper, *Ind. Eng. Chem., Anal. Ed.*, 2, 319 (1930).

[3] Neal and Northam, *Ind. Eng. Chem.*, 23, 1449 (1931).

[4] A.S.T.M. Standard, Designation D 430-40 (Methods B and C).

[5] *Ind. Eng. Chem.*, 34, 1275 (1942).

[6] Breckley, *Rubber Age (N. Y.)*, 53, 331 (1943).

[7] INDIA RUBBER WORLD, 108, 141 (1943).

[8] *Ind. Eng. Chem.*, 36, 29 (1944).

[9] *Ibid.*, 35, 1259 (1943).

[10] "The Carbon Reenforcement of Buna S (GR-S)", Columbian Carbon Co., Jan., 1943.

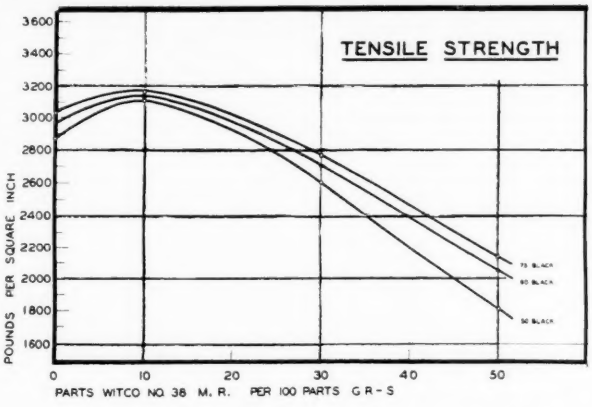

Fig. 1. Effect on Tensile Strength of Channel Black and M. R.

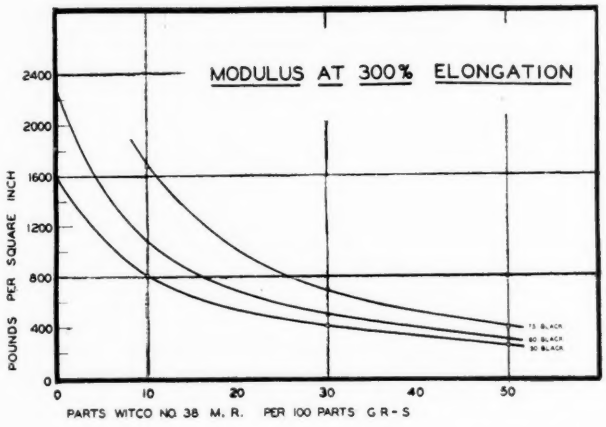

Fig. 2. Effect on Modulus at 300% of Channel Black and M. R.

After the specimens were nicked, the machine was run until the cut in each specimen had grown from 0.2-centimeter in width to 1.2 centimeter (no measurement of depth was made). Since several specimens were tested at once, the machine was stopped at about every 5,000 flexures, and the width of each cut was measured. When all samples had reached 1.2-centimeter cut width or more, the test was stopped. Since it seldom happened that the machine was stopped at exactly 1.2-centimeter cut width, a graph was constructed plotting cycles of flexing against the final crack width for each sample. The number of cycles corresponding to a total 1.2-centimeter cut width was then obtained by interpolation of the graphs.

"Cut growth" or "flex cracking growth resistance" can be reported in units of growth per cycle of flexing or in cycles required to cause a cut growth of a standard amount. We have used both "thousandths of an inch of growth per kilocycle of flexing" and "kilocycles of flexing required to cause a cut growth of 1.0 centimeter (from 0.2 to 1.2 centimeters)." The latter method is used to interpret the data in this experiment.

The A.S.T.M. D-430-40-B specification requires that the clamps grip each end of the sample over a length of 1⅜ inches, and that the machine be adjusted so that during each stroke the grips approach each other to a distance of ¾-inch and separate to a distance of three inches. This provides that the specimen is at about a 65-degree bend at its straightest position and at a complete 180-degree bend at its position of greatest flexure. (By 65-degree bend is meant that the sample has been moved through a dihedral angle of 65 degrees away from its normal straight position. At the 180-degree bend the sample is bent back upon itself completely.) Therefore the net angle through which flexure takes place is 115 degrees.

To determine the effect of variation in the angle of flexing, the following conditions were used for the tests:

a. The A.S.T.M. conditions; initial angle 65 degrees, final angle 180 degrees, net angle 115 degrees.
b. Initial angle 0 degree, final angle 115 degrees, net angle 115 degrees.
c. Initial angle 0 degree, final angle 90 degrees, net angle 90 degrees.

Because of the construction of the machine, the net angle of 90 degrees is the smallest angle of flexure that can be obtained on the Model D, National Rubber Machinery Co., De Mattia machine.

The test conditions described above were obtained by using the following settings when the specimens were mounted in the machine:

Test Conditions	Each End of Sample Gripped Over Length of	Distance between Grips Inches	
		Minimum	Maximum
a. From 65 degrees to 180 degrees (A.S.T.M.)	1⅜ inches	¾	3
b. From 0 degree to 115 degrees	1 11/32 inches	2 3/8	3 5/16
c. From 0 degree to 90 degrees	25/16-inch	3 1/16	4 1/16

For the tests in which the initial angle is 0 degree (i.e., the specimen is in a straight position) it is necessary to be careful at the beginning of the test in order to make the specimen bend with the groove on the outside.

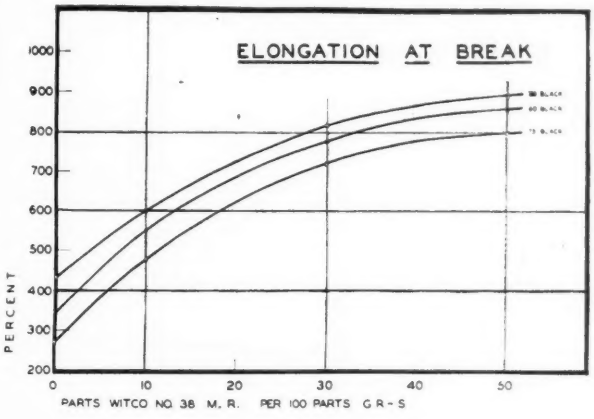

Fig. 3. Effect on Elongation of Channel Black and M. R.

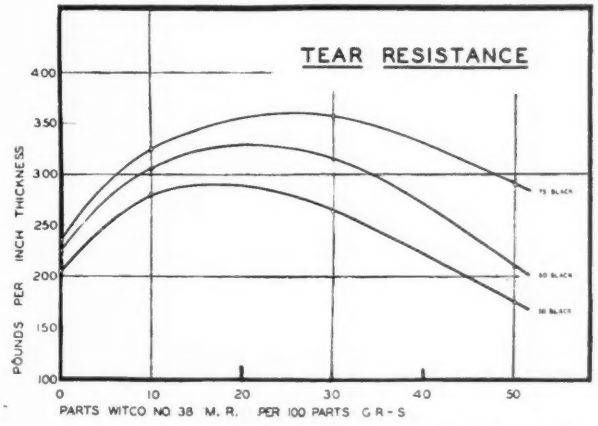

Fig. 4. Effect on Tear Resistance of Channel Black and M. R.

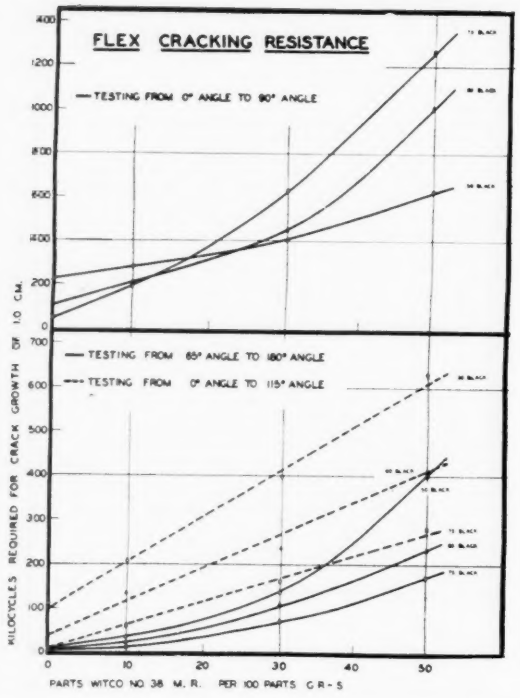
FLEX CRACKING RESISTANCE
TESTING FROM 0° ANGLE TO 90° ANGLE
TESTING FROM 65° ANGLE TO 180° ANGLE
TESTING FROM 0° ANGLE TO 115° ANGLE
KILOCYCLES REQUIRED FOR CRACK GROWTH OF 1.0 CM.
PARTS WITCO NO. 38 M. R. PER 100 PARTS G R - S

Fig. 5. Effect on Flex-Cracking Resistance of Testing from Different Angles With Varying Amounts of Channel Black and M. R.

After several flexures the specimen will have taken a very slight permanent set, enough so that it will bend in the right direction for the balance of the test, but not so much that it will not come back to 0 degree at the end of each flexure.

Discussion of Results

Table 2 and Figure 5 give the results obtained by testing flex cracking resistance as described above.

TABLE 2

Parts Channel Black per 100 Parts GR-S	Parts M.R. per 100 Parts GR-S			
	0	10	30	50
Flex Cracking Resistance—Testing at Angles from 65 Degrees to 180 Degrees (Kilocycles Required for Crack Growth of 1.0 Centimeter)				
50	9.0	33.	136	402
60	4.87	21.9	109	232
75	1.68	9.4	71	172
Flex Cracking Resistance—Testing at Angles from 0 Degrees to 115 Degrees (Kilocycles Required for Crack Growth of 1.0 Centimeter)				
50	111.	206	398	630
60	43.4	134	236	412
75	8.4	62	161	280
Flex Cracking Resistance—Testing at Angles from 0 Degree to 90 Degrees (Kilocycles Required for Crack Growth of 1.0 Centimeter)				
50	225.	280	403	640
60	114.	202	448	1040
75	49.2	197	635	1300

By comparing the data for a net angle of 115 degrees obtained by the two different methods (65 degrees to 180 degrees and 0 degree to 115 degrees) it can be seen that the effect of starting with an angle of 0 degree instead of 65 degrees is to increase greatly the number of flexures required to produce the standard cut growth.

The addition of softener increases resistance to cracking whether the test is made from 0 degree to 115 degrees or from 65 degrees to 180 degrees. However the relation between flex cracking resistance and amount of softener is more nearly a straight line for the 0 degree to 115 degrees conditions than it is for 65 degrees to 180 degrees.

The addition of channel black causes a decrease in resistance to cracking whether the test conditions are 0 degree to 115 degrees or 65 degrees to 180 degrees and irrespective of the amount of softener.

For the 0-degree to 90-degree conditions the addition of softener causes a reversal in the effect of channel black on flex cracking resistance. With 0 to 10 parts M. R. better resistance is obtained with 50 parts channel black than with 60 or 75 parts. With 30 to 50 parts M. R., however, the better resistance is given by 75 parts black.

Increase in softener content also causes a more marked increase in resistance to cracking when a net angle of 90 degrees is used than with a net angle of 115 degrees.

A similarity between the effect of compounding variations on modulus and the effect of the same variations on flex cracking resistance has been noted by several investigators; however, no information has been published on the correlation between these two tests. Since considerable saving in testing time would be accomplished if an adequate relation between modulus and flexing resistance could be arrived at, it seems desirable to investigate this relation.

Figure 6 is an attempt at correlating modulus and flex cracking resistance by plotting one against the other on log-log graph paper. Although there are some variations probably due to experimental error, straight lines of approximately the same slope are produced for the same angle of testing. The slopes of the lines for the 65- to 180-degree test conditions are slightly different from the slopes of the tests started at 0-degree angle.

The greatest advantage of Figure 6, however, is to indicate the direct dependence of flex cracking resistance upon modulus for the 65- to 180-degree test conditions. For the 0 degree to 115 degrees and 0 degree to 90 degrees conditions, changes in compounding ingredients (in this

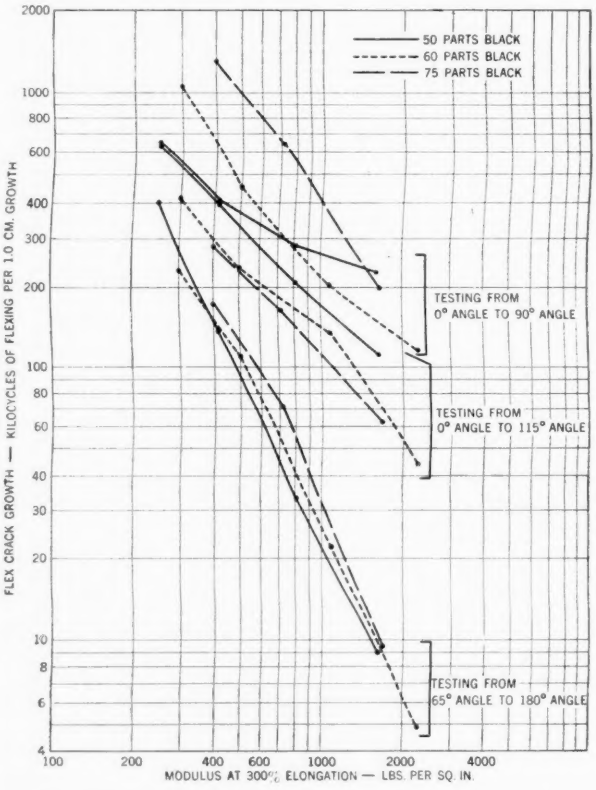
50 PARTS BLACK
60 PARTS BLACK
75 PARTS BLACK
TESTING FROM 0° ANGLE TO 90° ANGLE
TESTING FROM 0° ANGLE TO 115° ANGLE
TESTING FROM 65° ANGLE TO 180° ANGLE
FLEX CRACK GROWTH — KILOCYCLES OF FLEXING PER 1.0 CM. GROWTH
MODULUS AT 300% ELONGATION — LBS. PER SQ. IN.

Fig. 6. Correlation of Modulus and Flex-Cracking Resistance

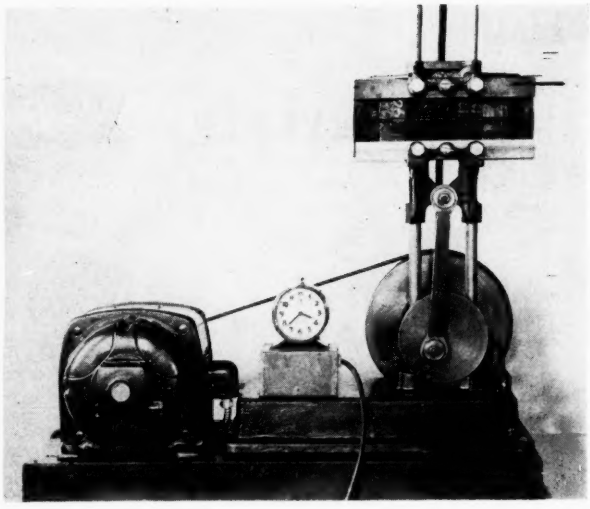

Fig. 7. The De Mattia Machine for Flex-Cracking Tests

case channel black) have a marked effect on the relation between flex cracking resistance and modulus.

In considering the proper angle through which flexure should take place on the De Mattia machine, it is of interest to note the comments of Prettyman[8] on the desirability of including in each flexing cycle periods of tension, zero strain, and compression. Although it is not possible to do this on the De Mattia machine, the use of the 0- to 90-degree conditions does give periods of zero strain and moderate tension, whereas the 65- to 180-degree test provides only variations in extreme tension.

Two miscellaneous facts dealing with the curing of specimens and the method of rating cut growth were learned during the course of this work. The first is that the flex cracking resistance is independent of the direction of the grain in the preparation of samples for curing for the stocks tested. The second is that the measurements of the number of flexures required to produce a definite crack growth is superior to the measurement of the number of flexures required to rupture completely the specimen. By the latter method very misleading results can be obtained. For example, some samples which had a very fast rate of crack growth did not rupture until after other samples with a slower rate of growth had failed. The difference seemed to be due to the formation of a skin of great strength at the back of some specimens which tended to keep the sample from failing.

Because of the fact that experiments cover only a part of the possible test conditions, we have not drawn any general conclusions regarding the best methods of testing for flex cracking resistance. The information is presented for what it is worth in aiding the establishment of satisfactory test conditions for use with the De Mattia machine.

The writer wishes to acknowledge the assistance of Miss Miriam Gelberd in performing a large part of the testing reported in this paper.

Effect of Temperature

(*Continued from page 406*)

25-volume zinc oxide stock with 10 parts of Naftolen was included in the evaluation. Turgum degraded resilience properties, and 20 parts lowered the property somewhat more than 10 parts of the turpentine gum. The effect of the Turgum was the same in 25- and 50-volume compounds. The 60-volume stock with 30 parts of Turgum was somewhat poorer in resilience than the lower pigmented compounds over the temperature range tested. With 10 parts of Naftolen in the GR-S stock higher resilience values, as compared with the control stock containing no plasticizer, were observed.

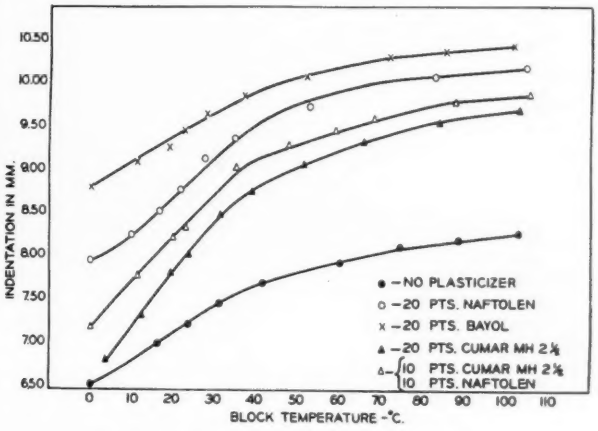

Fig. 6. Indentation Measurements on GR-S Stocks

Twenty parts of Naftolen, Bayol, Cumar MH2-½, and a mixture of this resin and Naftolen were compounded in GR-S with 25 volumes of GR-S oxide and the temperature-resilience data are shown in Figure 5. The indentation or the dynamic hardness of these stocks are plotted in Figure 6. Bayol, which is understood to be deodorized kerosene, substantially improved resilience over the temperature range investigated. The resilience of the Naftolen stock was about equal to the control. The blend of Cumar and Naftolen was slightly lower, and the Cumar MH2-½ had the lowest resilience. The stocks compounded with plasticizers had somewhat higher indentation values than the control, indicating the softening action of these materials. In this property the softeners ranged as follows: Bayol, Naftolen, mixture of Cumar MH2-½ and Naftolen, and Cumar MH2-½; the first had the greatest softening effect, and continuing in the order named.

(*To be concluded*)

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(*Continued from page 408*)

increases, run concentric oil grooves, inside edge rounded, about an inch in from the ends of the bearing starting just back of the feather edge of the reservoir and continuing around the bearing to the point where the lubricant enters, Figure 3. This procedure furnishes a complete internal system of lubricant conveyance and makes unnecessary any complicated, expensive force feed or flood-type lubrication mechanism. In fact all that is required with this system is a simple grease or oil cup of the type illustrated in Figure 4.

In this connection, a word about clearances; practical experience has proved the need, in large bearing work of this kind, of clearances equal to 0.00175-inch (one-and-

(*Continued on page 417*)

German Patents Relating to Synthetic Rubber-like Materials—X

M. Hoseh

THIS series of articles on German patents issued under their classification 39b, Group 4.01, published in the INDIA RUBBER WORLD during 1940 and 1941, covered these patents through No. 702,210 granted on February 1, 1941. Abstracts of German patents in this classification granted up to July, 1943, have become available and are published herewith in the hope that they may be of assistance to American rubber chemists and technologists.
EDITOR

New plasticizers for butadiene synthetic rubber are proposed in (A).[1] The plasticizers are esters of aliphatic carboxylic acids containing sulphur. For effective results in plasticizing, 7.5% and more of the ester is added to the polymer. The percentage is calculated on the basis of the polymer.

A new method for polymerizing butadiene hydrocarbons is claimed in (B), whereby the butadiene is emulsified in water. As emulsifier is used a salt of a sulphonic acid, a sulphonate, having emulsifying properties. The sulphonate is used in conjunction with a salt of a siccative oleic acid.

The subject of joining synthetic rubber and a fabric is dealt with in (C). More particularly the process applies to combining a butadiene copolymer with a fabric, as in the case of tires. The fabric is first covered with a layer of a mixture of latex and a proteinaceous substance. The coated fabric and the copolymer are joined either directly to each other, or between them is interposed a layer made up of a solution of the copolymer in a suitable hydrocarbon. To effect a better union quinoline is added to the copolymer or to the latex-protein mixture or to the intermediate layer in case such is used. The welding together of the whole is then done as usual.

Polymers are prepared by emulsion polymerization of butadiene together with other polymerizable compounds, according to (D). The polymerized emulsion is subsequently coagulated. The coagulated product contains an antioxidant. To plasticize the coagulated polymer, it is treated in an autoclave at an elevated temperature, such as 130-145° C., with compressed air.

A method for coating electric wire with synthetic rubber is described in (E). The wire is coated with a layer of synthetic rubber by spraying a solution of the rubber on the wire. The coated wire is preheated to a temperature below the vulcanizing temperature; then the sprayed synthetic rubber is vulcanized in an open flame.

A new method for plasticizing butadiene polymers is given in (F). The method applies equally to emulsion polymers of butadiene alone and to emulsion polymers of butadiene together with other polymerizable compounds. According to this method, the polymerization products are subjected to an oxidizing treatment in the presence of antioxidants. This treatment is done at an elevated temperature. Working with compressed air in autoclaves is not included in this patent.

Stabilizing 2-halo-1,3-butadiene polymers is discussed in (G). It claims that in order to stabilize polymerized 2-halo-1,3-butadiene, there are incorporated into the polymer mercaptans corresponding to the general formula of Y-R-SH. In this formula Y designates H or one or more of the following substituents, Cl, Br, I, NO_2, or SO_3M, where M is either H or an alkali metal. The R in the mercaptan formula stands for either an aryl or an aralkyl group.

The use of synthetic rubber for making brake linings is the subject of (H). These products are made from a mixture of 10-20% of a mixed polymerization product of butadiene and acrylonitrile, and 80-90% of a carbon specially prepared from a pressed and heated coal, e.g., coke, ground to a particle size of 0.05-1 milimeter and mixed with a binder. As binder can be used pitch or tar. This coal product is mixed with the butadiene-acrylonitrile polymerization product taken in proportion outlined above. This mixture is molded into brake linings and vulcanized.

A method to improve the working properties of rubber-like butadiene polymers is disclosed in (I), an addition to 702,209.[2] The parent patent recommends the addition of asymmetric hydrazine derivatives to emulsion polymerization products of butadiene or mixed polymerization products of butadiene and other polymerizable compounds. This addition is claimed to improve the working qualities of the synthetic rubber. For the same purpose (H) recommends adding small quantities of reaction products of the above hydrazine derivatives and aldehydes or ketones. These reaction products are added to the synthetic rubber in place of the asymmetric hydrazine derivatives.

Further improvements in the process of plasticizing butadiene polymers are recommended in (J) also related to (F). Besides substances added to the polymer according to (F) this patent recommends the addition of low molecular oxidizable compounds having an olefinic bond. These substances should not volatilize or volatilize only slightly under the working conditions and should not be antagonistic to the polymers. The mechanical treatment is the same as outlined in (F).

A method to improve the storage resistance of butadiene polymers appears in (K), whereby to butadiene polymers obtained in aqueous emulsion are added N-aralkylated naphthylamines. Then the emulsion is coagulated. The resulting product is claimed to have an increased resistance to storage.

Emulsion polymers of butadiene made with an alkylnaphthalene-sulphonic acid as emulsifier are not amenable to mechanical filtration or at best present considerable difficulties according to (L). A method is proposed

[1] Patent references appear at the end of this article.
[2] INDIA RUBBER WORLD, July 1, 1941, p. 39.

whereby the concentration of these emulsions is greatly facilitated. The method recommends cooling the emulsions to the point where they may be more easily filtrated and then concentrated by the usual mechanical operations.

Improving the workability of synthetic rubber is claimed in (M). This method pertains particularly to emulsion polymers of butadienes obtained either by themselves or together with other polymerizable materials, notably styrene. Ordinarily these polymerization products are subsequently subjected to elevated temperatures in the presence of antioxidants. (M) claims that to improve the working properties of the above products an anhydroformaldehydearylamine is incorporated into them before they are stored.

A new method for stabilizing rubber-like butadiene polymers is claimed in (N). It recommends adding water soluble oxygen acceptors to the aqueous emulsion of the polymer. It further recommends adding water insoluble compounds that prevent cyclization. The latter substances are added at the time the emulsion is precipitated.

The problem of stabilizing synthetic rubber-like products, particularly such as are obtained by polymerizing butadiene, either by itself or in combination with other polymerizable substances, is further taken up in (O). Here is recommended the addition of small quantities of alkali soluble substances that contain one or more aromatically linked hydroxy radicals. These substances consist of two or more aromatic rings bridged by the configuration —C—(x)(y). In this bridge x and y designate H, and/or alkyl or aryl radicals, or x and y may designate together alkylenes. This patent recommends incorporating the above substances into the polymer before storing it in an unvulcanized state.

A new factice-like substance for compounding rubber, claimed in (P), is produced by the action of an excess of sulphur chloride on a solution of butadiene rubber. For this process (P) recommends the use of sulphur chloride in an amount of 15-25% of the quantity of butadiene rubber treated. After completion of the reaction the solvent used to dissolve the butadiene is evaporated, and the product is after-treated with weakly basic substances.

New halobutadiene polymerization products, described in (Q) are obtained by polymerizing 2-fluoro-3-chlorobutadiene. This compound is polymerized either by itself or in combination with other polymerizable substances.

The use of a finely subdivided gas black as filler for butadiene rubber in vulcanizing the latter is claimed in (R). The gas black is of a kind produced by thermal decomposition of gaseous hydrocarbons. The synthetic rubber results from mixed polymerization of aqueous emulsions of butadiene compounds together with other polymerizable substances.

New recipes for synthetic rubber are the subject of (S). The mix consists of butadiene rubber, and in addition to the usual substances compounded with butadiene rubber, a small quantity of a mixture of phenylhydrazine and brown-coal tar.

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Nickel Alloy

(*Continued from page 415*)

three-quarter thousandths) and preferably 0.002-inch (two thousandths) per each diameter inch of the journal or roll-neck. The larger clearance is practically mandatory when the rolls are heated, owing to their increased expansion.

Summary and Conclusion

Both the manufacturers and users of rubber processing machinery have long searched for a bearing metal which would stand up under the severe conditions necessarily imposed upon it by the needs of the industry and which would be at the same time inexpensive, long wearing, easily handled, durable, and adaptable. Recently, however, the problem has been greatly aggravated by the fact that the rubber industry has had to abandon the use of crude rubber and resort to synthetic and plastic stocks which are much harder to work, and by their having to a considerable extent use existing equipment, since there was little time to develop and make new machines.

Long before the need became critical the Jackson Wheeler company, having the full cooperation of a large reclaimer, set about developing a white metal alloy which would have sufficiently high physical and bearing properties to insure completely successful operation under all conditions and which would, in addition, be totally reusable, non-abrasive, stable in structure, easily lubricated, highly heat resistant, and able to be handled in the factory by the regular maintenance personnel with existing facilities. An alloy, meeting all of these requirements, was finally perfected by the inclusion of pure nickel and cadmium in an especially prepared non-ferrous matrix under a carefully controlled crucible process. Called Tuftin No. 73 Nickel Alloy, it is readily available in convenient bar form; its purity and uniformity are assured by the exclusive use of virgin raw materials and by constant laboratory checking of each charge. Its acceptance, based on its performance over a period of a dozen years in the plants of many representative rubber producers, is increasing in this country and in Canada, Central and South America, and even in Africa.

Specification for GR-S

GR-S is a copolymer of butadiene and styrene to which approximately 1.5% of a standard rubber antioxident has been added during manufacture. Of the hydrocarbon present in GR-S, approximately 23% by weight is derived from styrene.

Specification Limits[1]

I. General

All GR-S shall be free of foreign or extraneous material, which is objectionable in normal rubber practice.

II. Chemical Tests

Test	Specification
A. Volatile matter	0.75% maximum
B. E-T-A extract	10.00% maximum
C. Fatty acid (as stearic acid)	3.00% maximum 6.00% maximum
D. Soap (soluble as sodium stearate)	0.75% maximum
E. Ash	1.50% maximum

III. Physical Tests

A. Viscosity of GR-S ML 212° F. @ 4 minutes		45 minimum 55 maximum	
B. Viscosity of Compounded Stock ML 212° F. @ 4 minutes		73 maximum	
C. Test on Vulcanizate at 82° F. Cure @ 292° F. — Minutes	25	50	90
Tensile strength — minimum p.s.i.		2500	
Ultimate elongation — minimum %		500	
Modulus @ 300% elongation —minimum p.s.i.	350	800	1050
Modulus @ 300% elongation —maximum p.s.i.	750	1200	1550

Sampling

I. Method of Sampling

Take at least one sample of approximately 300 grams for every 7500 pounds (100 bales) of GR-S. Take this sample from the inside of the bale by means of a punch or other device in such a way as to be free of dusting material. Immediately place about 50 grams of the sample in a tightly closed container and reserve it for the chemical tests. Reserve the remainder of the sample for the physical tests.

II. Sample Preparation

Combine the 50-gram samples from each lot that were reserved for the chemical tests and use them for the determination of volatile matter (Section 1A under Method of Analysis). Use the material resulting from the volatile matter determination for the other chemical tests (Section 1B, C, D and E under Method of Analysis).

Mass the 250-gram sample reserved for the physical tests by passing it ten times between the rolls of a laboratory mill meeting the specification given in Section II B 2 a under Method of Analysis, having a roll temperature between 110° and 130° F., and having a distance between the rolls of 0.055 plus or minus 0.005-inch as determined by a lead slug. In passes 2 to 9 inclusive, double the sample upon itself. On the tenth pass, sheet the sample without doubling upon itself. *Do not allow the sample to band on the mill rolls at any time.*

After aging the massed sample at room temperature for at least 30 minutes, prepare circular test pieces from its thickest portions by means of a circular die 1¾ inches in diameter for the viscosity determination (Section II A 1 under Method of Analysis). Trim these pieces around the edges so they will be as symmetrical, uniform in thickness, and free from porosity as it is practical to make them. See that their volume is such that one solid piece below the rotor and one above the rotor will be more than enough to fill completely the die of the Mooney viscometer. Bore or punch a hole through the center of the test piece to be placed below the rotor for the insertion of the rotor stem. *Do not use any test piece that is split.*

Combine the remainder of the massed samples from each lot. Blend the combined sample by passing it twice between the rolls of a laboratory mill under the same conditions used above for massing the individual samples. Then pass the sample five times between the rolls with the opening between them 0.030 plus or minus 0.005-inch. On each pass, roll the sample back on itself and feed it in endwise. Use this blended sample for the determination of the physical properties of the vulcanizate (Section II B 1 under Method of Analysis).

III. Sample Requirements

1. Combined sample for chemical analysis 450 grams minimum.
2. Blended sample for physical testing 400 grams.
3. File for future reference 400 grams of the blended sample used for physical testing and 50 grams of the material resulting from the volatile matter test.

Method of Analysis

I. Chemical

A. Volatile Matter. Weigh the combined sample for chemical analysis (minimum of 450 grams) to the nearest 0.1 gram. Pass the weighed sample repeatedly through a laboratory mill, with the rolls of the mill maintained at 200° to 220° F. and the distance between the rolls at 0.008 plus or minus 0.002-inch as determined by a lead slug. Do not allow the sample to band and take care to prevent any loss, especially to prevent loss of the sample under the guides. At the end of four minutes, weigh the sample to the nearest 0.1-gram. Pass the sample through the mill for an additional two minutes and reweigh it. If the weights at four and six minutes are within 0.1-gram, calculate the volatile matter; if not, continue passing the sample through the mill until the weight remains constant to 0.1-gram for at least a two-minute period. After the final minimum weight is recorded, sheet out approximately 50 grams for the other chemical tests, using the same temperature of and distance between the mill rolls so that the thickness of the sheet after cooling is less than 0.030 inch.

Calculation

$$\text{Volatile matter, \%} = \frac{100\,(A - B)}{A}$$

A = the weight of the original sample
B = the weight of the sample after milling

B. Ethanol-Toluene Azeotrope (E-T-A) Extract. Cut eight to eleven grams of the sheeted dry GR-S from the volatile matter determination (Section A above) into strips not wider than 1 cubic centimeter or longer than 5 cubic centimeters. Accurately weigh a six-gram sample for this determination, and save the remainder of the strips for the ash determination (Section E below).

Place the weighed sample in a 400-milliliter to 500-milliliter, wide mouthed flask. Add to the flask 100 milliliters of E-T-A prepared by mixing 70 volumes of ethyl alcohol and 30 volumes of toluene and distilling. (In the distillation discard the first and last portions of the distillate and use for this determination the main portion coming over within a range of 1° C.) Reflux the contents of the flask for one hour, preferably on a steam bath. If a hot plate is used, keep the flask from touching the hot plate by means of a wire gauze or asbestos mat in order to prevent the GR-S from sticking to the flask. After refluxing, decant the liquid into a 250-milliliter volumetric flask. Add a second 100-milliliter portion of the azeotrope to the GR-S sample, and reflux again for one hour. Decant the liquid into the volumetric flask. Rinse the GR-S with three successive 10-milliliter portions of fresh azeotrope, and add these rinsings to the volumetric flask. Cool the flask and its contents to room temperature and add enough of the azeotrope solution to bring the volume to exactly 250-milliliter. Mix the solution thoroughly and use this E-T-A extract for the determination of fatty acid and soap (Sections C and D below).

Add approximately 25-milliliter of acetone to the GR-S in the flask. Heat the acetone to gentle boiling and boil it for about five minutes. Decant the acetone and transfer the extracted GR-S to a tared watch glass. Dry the GR-S to constant weight at 105° C. (About two hours is usually required for the drying when an oven without forced draft is used.)

Calculation

$$\text{E-T-A extract, per cent} = \frac{100\,(A - B)}{A}$$

A = the weight of the original dry sample
B = the weight of the extracted sample

C. Fatty Acid. Measure out with a pipette or other means two 100-milliliter portions of the E-T-A extract saved from the E-T-A extract determination (Section B above). (It is suggested that these two portions be measured immediately after the solution in the volumetric flask is adjusted to volume and mixed. Otherwise it may be necessary to adjust the temperature of the volumetric flask to bring the volume of the solution again to exactly 250-milliliter before measuring out these portions.) Save one 100-milliliter portion for the soap determination (Section D below).

To the other 100-milliliter portion of the azeotrope add eight to ten drops of thymol blue and phenolphthalein indicator solution (one part of 0.25% thymol blue in 50% alcohol and three parts of 0.25% phenolphthalein in 50% alcohol). Titrate this solution to the blue or bluish purple end point. Run a blank titration, using 100-milliliter of fresh azeotrope solution and the same amount of indicator. Deduct the volume of sodium hydroxide solution used for the blank from that used for the titration. (After the titration, the E-T-A in the solution may be recovered and reused.)

Calculation

$$\text{Total acidity, as \% stearic acid} = \frac{B \times C \times 28.4 \times 2.5}{A}$$

A = the weight of the original dry sample used for the E-T-A extract determination (Section B above)
B = the milliliter of standard sodium hydroxide solution used for the titration (corrected for blank)
C = the normality of the sodium hydroxide solution

D. Soap. Add eight to ten drops of bromphenol blue indicator solution (0.1% of bromphenol blue in 20% alcohol) to the 100-milliliter portion of the E-T-A extract saved for the soap determination. (See

[1] All specification limits include the tolerances of the test method. Any lot represented by a sample which fails in one or more tests to meet the specification limits may be retested. For this purpose two additional samples shall be taken according to the same procedure as the original sample. Failure of either in any respect shall be cause for rejection.

Section C above.) Titrate this solution at room temperature with 0.05N hydrochloric acid solution to a pure yellow end point. Run a blank titration, using 100-milliliter of fresh azeotrope and the same amount of indicator. Deduct the volume of hydrochloric acid solution used for the blank from that used for the titration. (After the titration, the E-T-A in the solution may be recovered and reused.)

$$\text{Alkalinity, as \% sodium stearate} = \frac{B \times C \times 30.6 \times 2.5}{A}$$

A = the weight of the original dry sample used for the E-T-A extract determination (Section B above)
B = the milliliter of hydrochloric acid solution used for the titration (corrected for blank)
C = the normality of the hydrochloric acid solution

E. Ash. Accurately weigh two to five grams of the dry GR-S strips prepared during the E-T-A extract determination (Section B above) into a crucible which has been ignited to constant weight at 550° plus or minus 50° C. (The crucible should have a volume of 15 to 25-milliliter for each gram of sample.) Place the crucible directly into a muffle furnace at 550° plus or minus 50° C., and allow it to remain there for three hours. *Caution: Do not open the door of the furnace during the first hour.* At the end of three hours, remove the crucible from the furnace, cool it to room temperature in a desiccator, and weigh it.

$$\text{Ash, \%} = \frac{100\,(B - C)}{A}$$

A = the weight of the original dry sample
B = the weight of the crucible plus the ash
C = the weight of the crucible

II. Physical

A. Mooney Viscosity. 1. *On GR-S.* Determine the viscosity of the GR-S sample prepared according to the instructions under Sample Preparation on the Mooney Viscometer at 212° F., using the rotor 1.5 inches in diameter. Allow the sample to warm one minute at 212° F. after closing the platens. Take as the viscosity the minimum reading of the dial observed between 3 minutes 45 seconds and 4 minutes 15 seconds. When the viscosity is outside the specification limits by one unit or less, determine the viscosity as follows:

Take and record readings of the dial at five-second intervals from three to five minutes. Plot these readings against the time. Draw a smooth curve through the minimum points of the periodic fluctuations, or through all points if there are no fluctuations. Take as the viscosity the point on this curve corresponding to four minutes.

2. On Compounded Stock. Determine the viscosity of the compounded stock, sampled according to Item 11 under Section II B 2 b below, in the Mooney viscometer at 212° F., using the rotor 1.5 inches in diameter. Allow the sample to warm one minute at 212° F. after closing the platens.

Take as the viscosity the minimum reading of the dial observed between 3 minutes 45 seconds and 4 minutes 15 seconds. When the viscosity is outside the specification limits by one unit or less, determine the viscosity as follows:

Take and record readings of the dial at five-second intervals from three to five minutes. Plot these readings against the time. Draw a smooth curve through the minimum points of the periodic fluctuations, or through all points if there are no fluctuations. Take as the viscosity the point on this curve corresponding to four minutes.

[2] All compounding ingredients shall meet Rubber Reserve Co. specifications and be equivalent to Rubber Reserve Co. standard samples.
[3] See "A.S.T.M. Standards on Rubber Products", Feb., 1944, pp. 32-33.

B. Physical Properties of Vulcanizate. 1. *Recipe.*[2]

	Parts	Grams
GR-S*	100.0	400.0
Standard Wyex channel black†	50.0	200.0
BRT #7†	5.0	20.0
Zinc oxide	5.0	20.0
Sulphur	2.0	8.0
Mercaptobenzothiazole	1.5	6.0
Total	163.5	654.0

* Blended sample prepared according to Sample Preparation.
† Specification of this material is for purposes of a standard test formula only and is not to be construed as an endorsement for use of this material in production.

Weigh all ingredients to within 1.0% of the weight specified. Make sure that the final weight of the mixed batch [Section 2 b(8) below] and the sum of the weights of all ingredients do not differ by an amount exceeding 1.0% for a compounded batch.

2. Mixing. a. *Equipment.* Use a laboratory rubber mill meeting the following specification:
(1) Rolls 12 inches in width and 6 inches in outside diameter.
(2) Distance between guides—10½ inches.
(3) Front roll speed—24 r.p.m.
(4) Back roll speed—33.6 r.p.m.
(5) Circulating cooling water through the rolls.
(6) Mill roll opening—adjustable between 0.008-inch and 0.150-inch.
(7) Roll temperature indicator accurate to plus or minus 5° F.

b. *Procedure.* Measure the temperature at the middle of the surfaces of the rolls with the roll temperature indicator at intervals during the mixing procedure. If necessary, remove the batch momentarily from the mill to check the front roll temperature. Maintain the roll temperature between 110 and 130° F. throughout the mixing procedure by adjusting the flow of cooling water through the mill rolls.

Mix the compound as described below, establishing all mill openings by means of a lead slug. Whenever ¾ cuts are specified, cut the stock ¾ of the way across the roll and hold it until the bank just disappears. When cuts each way are specified, make successive cuts from alternate directions.

Operation	Time in Minutes
(1) Pass the GR-S through the rolls twice, without banding, at a mill setting of 0.008 plus or minus 0.002-inch	1 to 2
(2) Band the GR-S on the front roll with the mill set at 0.055 plus or minus 0.005-inch, and make ¾ cuts every ½-minute from alternate sides	10
(3) Add the carbon black evenly across the mill and at a uniform rate. Open the mill at intervals so as to maintain an approximately constant bank. Make one ¾ cut from each side, when one-half of the black has been added, and another ¾ cut from each side when all of the black has been added except that which has fallen through the rolls. Then add the black in the pan. Do not cut the stock with free black on the bank. (*Note:* To add the black at a uniform rate, it is convenient to use an "hour glass" which will deliver 200 grams of Wyex Standard Channel Black in 10 minutes. The "hour glass" may be made from a 500-milliliter reagent bottle having a plastic screw cap through which a hole of suitable size has been drilled. A mark should be placed on the bottle to indicate when 100 grams of the black have been added)	12
(4) Add BRT #7 which has been melted at a temperature of less than 220° F. and has not been kept longer than 30 minutes at the high temperature	2
(5) Add the zinc oxide, sulphur, and accelerator, taking care to avoid loss.	4
(6) Make three ¾ cuts each way	2
(7) Cut the batch from the mill. Set the mill at 0.030 plus or minus 0.005-inch and pass the rolled stock endwise through the mill six times.	2
(8) Check the batch weight.	½
(9) Band the stock and sheet it out to a minimum thickness of 0.25-inch.	½
Total	34 to 35

(10) Allow the stock to rest for at least one hour and for not more than three days.
(11) Take the viscosity sample.
(12) Pass the stock through the rolls twice, without banding at a mill setting of 0.008 plus or minus 0.002-inch. Band the stock, make three ¾ cuts each way, and sheet it to a thickness of approximately 0.085-inch. Cool the batch to room temperature on a flat surface. Cut it into slabs measuring ⅛-inch less in width and length than the corresponding dimensions of the mold cavity, and weighing between 62 and 68 grams. Mark the direction of the grain of the stock on each slab. Allow the unvulcanized stock to age for at least one hour and for not more than three days before curing it. (*Note:* It is desirable to age the stock in subdued light in air having a relative humidity of 45% at 82° F.)

3. Curing. a. *Equipment.* (1) *Mold.* Use a highly polished, hard chromium plated mold (preferably of the hinged type to minimize scratching of the mold surfaces) similar in dimensions to that shown in Figure 1,[3] which gives sheets 6 by 6 by 0.075 inches. *Do not use a mold lubricant under any circumstances.*

(2) *Press.* Use a hydraulic press which will give a pressure on the mold of not less than 500 p.s.i. and which has platens of sufficient size so that no portion of any test sheet will be nearer than three inches to the edge of the platen during vulcanization. In order to avoid cool spots in the platens due to condensed moisture, use preferably a press with bored platens. If a press with chamber platens is used, place the steam outlet slightly below the steam chamber so that good drainage is assured. In either case, verify actual platen temperatures by means of thermocouples in the mold, or by some other suitable temperature measuring device.

b. *Procedure.* Vulcanize the test slabs in the mold at a temperature of 292° plus or minus 1° F. for the specified time while the mold is held under a minimum of 500 p.s.i. pressure in the press. Consider the time of cure to be the period between the instant the hydraulic pressure on the mold reaches its maximum and the instant the pressure is released.

Before inserting the uncured slabs in the mold, bring the mold to the curing temperature by holding it in the closed press at curing temperature for not less than 20 minutes. Keep to a minimum the time between the instant that the slabs are placed in the hot mold and the instant that the full pressure is applied to the mold in the press. Remove the cured sheets from the mold immediately after the conclusion of the cure and cool them in water for 10 minutes. Wipe the sheets dry and reserve them for test.

4. Testing. a. *Equipment.* (1) *Die.* Use a suitably constructed steel die which will produce test specimens conforming in size and shape to that illustrated in Figure 2.[4]

(2) *Stress-Strain Testing Machine.* Use a power driven machine, preferably of the inclination balance or pendulum type having a dynamometer head of the compensating type for convenience in eliminating calculations. Use a spring-balance type of machine only if provision is made to prevent sudden recoil of the spring. In any case, use a machine which fulfills the following requirements:

(a) The applied tension indicated by a dial or scale shall be accurate within plus or minus 1%.

(b) The indicator shall remain at the point of maximum load after rupture of the test specimen.

[4] *Ibid.*, p. 40, Fig. 3, Die C.

(c) The grips which hold the specimen in the testing machine shall be of a type which tightens automatically and exerts a uniform pressure across the gripping surface proportional to the applied tension so as to avoid uneven slipping and to insure failure of the test specimen in its constricted portion.

(d) The rate of travel of the power actuated grip shall be 20 inches per minute and shall be uniform at all times.

(e) A scale graduated to 0.1-inch and suitably attached to the measuring trammel points or held back of the test specimen shall be provided for measuring the elongation.

(f) The testing machine shall be designed to permit calibration as described below.

(g) The testing machine used for a given test specimen shall be of such capacity that the maximum load required to break the specimen shall not be greater than 85 nor less than 15% of the rated capacity.

b. *Calibration of Equipment.* Calibrate the stress-strain machine by applying dead weights in an ascending order while the machine is otherwise arranged in a manner entirely similar to that used when specimens are tested. Each time an additional weight is added, move the weight lever to the zero position and allow it to swing slowly upward as far as it will go. If the dial does not then indicate the value of the weight applied, adjust the machine and repeat the above procedure until it does so indicate.

c. *Preparation of Test Specimens.* Do not heat the cured sheets or specimens, or immerse them in water, or subject them to any mechanical or chemical treatment prior to test, except as specifically prescribed herein, since any such treatment may definitely change their stress-strain characteristics. Particularly, avoid previous stretching of the sheets or specimens through inadvertent handling.

Place the sheet from which the specimens are to be cut on a smooth, slightly yielding surface, such as lightweight cardboard or leather, to avoid injuring the die. By means of a sharp steel die free from nicks, stamp the test specimens from the cured sheet in the direction of the grain. To facilitate cutting, wet the cutting edges of the die. See that the cut edges are perpendicular to the other surfaces of the specimen, have a minimum of concavity, and are free from ragged edges.

Mark on the reduced section of the specimen two parallel gage lines 1.00 plus or minus 0.01-inch apart equidistant from the center, and perpendicular to the longitudinal axis. Make the marks as narrow as possible consistent with legibility. If a stamp with parallel steel blades is used, take care not to injure the specimen.

Measure and record the thickness and width of the reduced section of the test specimen without deformation by means of an instrument accurate to 0.001-inch. (*Note:* The width of each specimen need not be measured, but measurements shall be made frequently enough to obtain a reliable value for the width.) Use the minimum thickness and width of the specimen between the gage marks in calculating the area used in determining the stress-strain characteristics of the specimen. Do not use specimens which are not 0.250 plus or minus 0.005-inch in width in the reduced section between the gage marks or those which exceed 0.100-inch in thickness.

d. *Procedure.* Allow the test specimens to age after vulcanization for at least one hour and for not more than three days before testing. Just prior to testing, condition the specimens at the test temperature for at least 30 minutes. Record the test temperature.

Place the test specimen in the grips of the stress-strain testing machine, using care to adjust them symmetrically in order that the tension will be distributed uniformly over the cross-section. Start the machine and note continuously the distance between the gage marks, taking care to avoid parallax. Record the stress at 300% elongation (tension in pounds when gage marks are four inches apart) and at rupture, preferably by means of an autographic or spark recorder. At rupture, also record the elongation to the nearest 0.1-inch.

c. *Calculations.* Calculate the stress-strain characteristics of a sample from the results obtained on three typical specimens. (See Section f. below for definition of a typical specimen.) Average the corresponding values from the three specimens after making the following calculations:

(1) *Tensile Strength.* Divide the stress in pounds at rupture by the original area of the cross-section of the test specimen in square inches.

(2) *Ultimate Elongation.* Subtract the original distance between gage marks in inches from the total distance between the marks at rupture. Express this difference as a percentage of the original distance as follows:

$$\text{Ultimate elongation, } \% = \frac{100\,(A - B)}{B}$$

where: A = The distance between the gage marks at rupture
B = The original distance between the gage marks

(3) *Tensile Stress or Modulus at 300% Elongation.* Divide the stress in pounds at 300% elongation by the original area of the cross section of the test specimen in square inches.

TABLE 1. TEMPERATURE CORRECTION FACTORS

Multiply the values obtained for the tensile properties by the factor corresponding to temperature at which the test was made in order to correct to 82° F.

Temp. ° F	Tensile Strength	Stress at 300%	Ultimate Elongation
60	.82	.96	.91
61	.83	.96	.92
62	.84	.96	.92
63	.85	.96	.92
64	.86	.96	.93
65	.86	.97	.93
66	.87	.97	.94
67	.88	.97	.94
68	.89	.97	.94
69	.90	.97	.95
70	.90	.98	.95
71	.91	.98	.96
72	.92	.98	.96
73	.93	.98	.96
74	.94	.98	.97
75	.94	.99	.97
76	.95	.99	.98
77	.96	.99	.98
78	.97	.99	.98
79	.98	.99	.99
80	.98	1.00	.99
81	.99	1.00	1.00
82	1.00	1.00	1.00
83	1.01	1.00	1.00
84	1.02	1.00	1.01
85	1.02	1.01	1.01
86	1.03	1.01	1.02
87	1.04	1.01	1.02
88	1.05	1.01	1.02
89	1.06	1.01	1.03
90	1.06	1.02	1.03
91	1.07	1.02	1.04
92	1.08	1.02	1.04
93	1.09	1.02	1.04
94	1.10	1.02	1.05
95	1.10	1.03	1.05
96	1.11	1.03	1.06
97	1.12	1.03	1.06
98	1.13	1.03	1.06
99	1.14	1.03	1.07
100	1.14	1.04	1.07
101	1.15	1.04	1.08
102	1.16	1.04	1.08
103	1.17	1.04	1.08
104	1.18	1.04	1.09
105	1.18	1.05	1.09
106	1.19	1.05	1.10
107	1.20	1.05	1.10
108	1.21	1.05	1.10
109	1.22	1.05	1.11
110	1.22	1.06	1.11

If the specimens were not tested at 82° F., the temperature at which the specification limits apply, correct the average values obtained to 82° F., using the temperature correction factors given in Table 1.

f. *Typical Specimens.* Accept as typical specimens for modulus at 300% elongation only those which have values within a range of 100 p.s.i. Accept as typical specimens for tensile strength and ultimate elongation only those which are typical for modulus at 300% elongation and which have values of tensile strength within a range of 300 p.s.i. and of ultimate elongation within a range of 50%.

In cases in which the first three specimens tested are not typical, test one additional specimen. If three of the four specimens are typical, average the results of the typical specimens. If not, test a fifth and then a sixth specimen in a similar manner. If three typical specimens are not obtained in six specimens, mix, cure, and test a new batch from the same GR-S blend.

In case there should be two or three sets of three typical specimens as a result of testing a fourth, fifth, or sixth specimen, average the results of each possible set of three typical specimens. Take as the value of the property the average of the averages so obtained.

This specification is issued by Rubber Reserve Co., Washington 25, D. C., upon the request and with the approval of the Committee on Specifications for Synthetic Rubbers which is giving further study to the specification and test methods used.

Approved—May 23, 1944
Released—June 5, 1944
Effective—July 1, 1944

Chicago Group Elects Officers

THE Chicago Rubber Group met May 19 for the annual election of officers at the Terrace Casino, Morrison Hotel, Chicago, Ill., with 160 members and about 50 guests present. Officers elected for the 1944-45 season include: chairman, B. W. Hubbard, Ideal Roller & Mfg. Co.; vice chairman, J. P. Sheridan, New Jersey Zinc Sales Co.; and secretary-treasurer, W. F. Bernstein, of W. F. Bernstein, Consultants. Directors for the two-year term are: Paul Van Cleef, Van Cleef Bros.; B. Kaufman, Dryden Rubber Co.; C. M. Baldwin, United Carbon Co., Inc.; and S. A. Weller, E. I. du Pont de Nemours & Co., Inc. Directors for the one-year term are: H. I. Houlette, Inland Rubber Corp.; D. M. Pratt, Marbon Corp.; W. H. Lussie, R. T. Vanderbilt Co., Inc.; and J. R. Morath, Naugatuck Chemical Division of United States Rubber Co. The following past chairmen also act as members of the board of directors: E. T. Meyer, Herron Bros. & Meyer; Calvin Yoran, Witco Chemicals Co.; H. A. Winkelmann, Dryden Rubber; and C. B. Frick, Van Cleef Bros. The members of the nominating committee were: chairman, C. M. Baldwin, United Carbon; K. A. Sidell, W. H. Salisbury & Co.; W. H. Crumpler, George S. Mepham Corp.; Embert Stanger, Chicago Belting Co.; Dr. Winkelmann; and Mr. Bernstein.

Following dinner H. Walter Grote, Wilmington Chemical Corp., entertained the group with a demonstration of thought reading.

The technical session of the evening was devoted to a presentation of "Some Research Aspects on Synthetic Rubbers" by Ira Williams, of J. M. Huber, Inc.

The Group will hold a stag tournament at the Lincolnshire Country Club for members and guests on July 22.

Specifications for Scrap Rubber

As Revised June 1, 1944, by The Rubber Reclaimers Association

General Specifications

THE following general specifications apply to all grades of scrap rubber.

1. *Origin of Scrap.* Unless otherwise specified on the purchase order, all material sold to conform to these specifications shall be of United States or Canadian manufacture, or its equivalent.

2. *Net Weight.* All grades of scrap rubber, except foreign scrap as hereinafter noted, shall be paid for on the basis of the net weight determined at the Buyer's plant. Bags, coverings or containers shall not be included in the net weight nor shall the Buyer be under obligation to return them to the Seller.

3. *Ton Weight.* Unless otherwise specified on the purchase order, a ton shall be 2,000 pounds.

4. *Foreign Scrap.* In the case of purchase of scrap rubber of foreign manufacture, delivery shall be made c.i.f. Port of Entry of weight shown by a sworn weigher's certificate secured by and at the expense of the Seller. A copy of such certificate shall be supplied to the Buyer. Unless otherwise specified on the purchase order, such foreign shipments shall be subject to the same conditions as domestic shipments.

5. *Bales.* Passenger Tires and Truck Tires, Grades (a), (b), (c), Solid Tires and Air Brake Hose may be shipped bundled or loose in cars. All other grades shall be packed in bags or bales. Each bale shall weigh not less than 500 pounds, nor more than 1,500 pounds and shall be well and securely bound with galvanized wire, when available. Bales which fall apart during shipment or unloading shall be considered as having been shipped loose. Material shipped contrary to these provisions constitutes an improper delivery and is subject to the provisions of Paragraph 12.

6. *Separation of Grades.* Each grade of scrap rubber shall be packed separately and other material present shall be subject to rejection as provided in Paragraph 12.

7. *Moisture and Foreign Material.* All scrap rubber shall be free from foreign material including mud, stones and cinders. When a shipment is received wet, the Buyer shall have the option of one of the two following procedures:

(a) He may estimate the amount of moisture and arrange for an allowance by mutual agreement with the shipper.

(b) He may select a representative sample of a shipment amounting to a minimum of either 500 pounds or 5% of the shipment and determine moisture content. This determination shall be made by drying the sample and determining the per cent shrinkage from wet to dry weight, which per cent shall be considered representative of the shipment. Two and one-half per cent shall be considered normal and allowable moisture content, and the invoice shall be adjusted accordingly.

8. *Synthetic Rubber.* Scrap containing synthetic rubber shall be delivered only subject to specific agreement between the Buyer and the Seller, except as indicated in (b).

(a) Tires and tubes manufactured with a synthetic rubber content which are improperly included in a delivery are subject to rejection in the same manner and with the same penalties that apply to other rejectable scrap.

(b) Tires manufactured of natural rubber but retreaded with synthetic rubber other than "Thiokol" shall be accepted as good delivery, provided that such retreaded tires do not constitute more than 25% of any single shipment.

(c) The detection of any synthetic scrap in a delivery of tire parts against an order that does not specifically provide for synthetic scrap makes the entire shipment rejectable and returnable at the option of the Buyer. Settlement shall not involve sorting on the part of the Buyer or acceptance at a lower price, except as the Buyer may freely agree.

(d) When a purchase order for any standard grade of scrap not covered by the above provisions does not specifically provide for the inclusion of synthetic scrap, it is understood that the dealer guarantees that deliveries will not contain synthetic scrap. The discovery of any percentage of synthetic scrap under those conditions will make the entire shipment rejectable at the option of the Buyer without sorting or settlement by adjustment of price.

9. *Embargo.* If the Seller shall serve notice on the Buyer that an embargo prevents delivery of material within the time specified in the purchase contract, the Buyer shall grant an extension equivalent to the period of the embargo without otherwise changing the terms of the contract.

10. *Failure to Deliver.* If the Seller does not deliver in accordance with this contract, the Buyer may purchase a corresponding amount of scrap and charge the Seller for any loss incurred by such purchase.

11. *Claims.* All rejections or claims arising from the weight, quality, or condition of shipment shall be reported to the Seller promptly. Such claims when due to weight shall be reported within ten days and when due to other causes shall be reported within thirty days of the arrival of the material at the Buyer's plant.

12. *Rejections.* Any shipment of material which constitutes an improper delivery, because it is improperly packed, or includes material not covered by the purchase, or because it is not a good delivery of the grade of scrap bought, shall be subject to the following provisions:

(a) Such shipment shall be subject to acceptance or rejection in whole or in part at the option of the Buyer.

(b) If a shipment is rejected in whole or in part, the Seller shall have thirty days within which to give instructions for the material to be shipped f.o.b. Buyer's plant. If shipping instructions are not given within thirty days, the Buyer may dispose of the rejected material. The Seller shall make replacement at the Buyer's plant within thirty days of the date of notice of such rejection. In the case of a rejection of a full car not yet unloaded the Seller shall give disposition immediately, and all demurrage shall be charged to the Seller.

(c) The total cost of handling and storing rejected material shall constitute a charge against the Seller whether or not any part of the shipment is retained by the Buyer. In the case of grades packed in bags or bales which must be opened and sorted, the charge for sorting shall be one-fourth cent per pound of the entire weight sorted.

Standard Grades

The following constitute the standard grades of scrap rubber. Specifications for any group apply to all the divisions of that group:

1. *Passenger Tires.* Shall consist of whole pneumatic tire casings having six plies or less, and shall be free from hard, oxidized, burnt, filled, non-pneumatic, single tube and motorcycle tires, and from leather and metal.

(a) *Mixed Passenger Tires.* This grade shall consist of black whole tires free from stripped tires. White or colored sidewall tires are permissible. A maximum of 10% may consist of roadworn tires.

(b) *Roadworn Passenger Tires.* This grade shall consist of Mixed Passenger Tires Tires from which a substantial part of the tread has been worn through so that the fabric shows for a distance of at least one-half of the circumference of the tire.

(c) *Beadless Passenger Tires.* This grade shall consist of Mixed Passenger Tires from which the beads have been cut, but which conform otherwise to the specifications for Mixed Passenger Tires.

(d) *No. 1 Passenger Peelings.* This grade shall consist of treads stripped from black pneumatic passenger tires. The material shall be free from fabric, metal, leather, and hard, burnt, or oxidized treads.

No. 1A Passenger Peelings shall be free from cushion rubber.

No. 1B Passenger Peelings may contain cushion rubber.

(e) *No. 2 Passenger Peelings.* This grade shall consist of treads stripped from black pneumatic passenger tires. The material may contain cushion rubber, breaker fabric and sidewalls plus no more than one full ply of carcass fabric.

(f) *No. 3 Passenger Peelings.* (*Bald Head Peelings*). This grade is the same as No. 2 Passenger Peelings except that a part of the tread has been removed.

(g) *Passenger Dykes.* This grade shall consist of Beadless Passenger Tires from which two or more layers of fabric have been removed.

(h) *Passenger Carcass.* This grade shall consist of pieces of pneumatic passenger tires containing no tread, sidewall, bead or cushion rubber.

(i) *Passenger S.A.G.* This grade shall consist of pieces of pneumatic passenger tires from which the treads and beads have been removed and may or may not contain sidewall rubber.

2. *Truck Tires.* Shall consist of whole pneumatic tire casings for buses and trucks having seven plies or more, and shall be free from hard, oxidized, burnt, filled, non-pneumatic single tube tires, and from leather and metal.

(a) *Mixed Truck Tires.* This grade shall consist of black whole tires free from stripped tires. White or colored sidewall tires are permissible. A maximum of 10% may consist of Roadworn Tires.

(b) *Roadworn Truck Tires.* This grade shall consist of Mixed Truck Tires from which a substantial part of the tread has been worn through so that the fabric shows for a distance of at least one-half the circumference of the tire.

(c) *Beadless Truck Tires.* This grade

shall consist of Mixed Tires from which the beads have been cut, but which conform otherwise to the specifications for Mixed Truck Tires.

(d) *No. 1 Truck Peelings.* This grade shall consist of treads stripped from black pneumatic bus and truck tires. The material may contain cushion rubber, but shall be free from fabric, metal, leather, and hard, burnt, or oxidized treads. This grade may contain not more than 10% of No. 1 Passenger Peelings

No. 1A Truck Peelings. This grade shall have the same specification as above except these peelings shall be free from cushion rubber.

(e) *No. 2 Truck Peelings.* This grade shall consist of treads stripped from black pneumatic bus and truck tires. The material may contain cushion rubber, breaker fabric and sidewalls, but no more than one full ply of carcass fabric.

(f) *No. 3 Truck Peeling (Bald Head Peelings).* This grade is the same as No. 2 Truck Peelings except that a part of the tread has been removed.

(g) *Truck Dykes.* This grade shall consist of Beadless Truck Tires from which two or more layers of fabric have been removed.

(h) *Truck Carcass.* This grade shall consist of pieces of pneumatic bus and truck tires containing no tread, sidewall, bead or cushion rubber.

(i) *No. 1 Truck S.A.G.* This grade shall consist of pieces of pneumatic bus and truck tires from which the tread and beads, but not the sidewalls, have been removed.

(j) *No. 2 Truck, S.A.G.* This grade shall consist of a mixture of No. 1 Passenger S.A.G. with No. 1 Truck S.A.G. and may or may not contain sidewall rubber.

(k) *Light Colored Carcass.*

(1) *No. 1 Light Colored Carcass.* This grade shall consist of all white zinc carcass free of black edges and any other colored rubber.

(2) *No. 2 Light Colored Carcass.* This grade shall consist of light colors as white, pink, light gray, pure gum and light brown carcass, free of all black edges and dark colored rubber.

(l) *Gray Carcass.* This grade shall consist of gray, and colors too dark for delivery under No. 2 Light Colored Carcass, and shall be free of all black edges and black rubber.

3. *Passenger Tubes.* Shall consist of inner tubes for pneumatic passenger tires, free from truck, bus and puncture-proof tubes, crusty and oxidized tubes, and free from metal and punchings. Sections of tube less than 12 inches long are not good delivery. All passenger tubes, except grade (f) Mixed Passenger Tubes, shall be free from metal valves. All passenger tubes except (f), Mixed Passenger Tubes, and (e), Black Passenger Tubes, shall be free from black rubber valve cots and the bases of such valves.

(a) *No. 1 Passenger Tubes.* This grade shall be strictly elastic, floating tubes free from black or colored tubes.

(1) Transparent Floating Tubes are Transparent No. 1 Tubes.

(2) Brown Floating Tubes are No. 1 tubes containing no white tubes.

(b) *No. 2 Passenger Tubes.* This grade shall consist of compounded passenger tubes free from black, red and two-toned passenger tubes.

(c) *Light Colored No. 2 Passenger Tubes.* This grade shall consist of No. 2 Passenger Tubes specially selected as to color by agreement between the Buyer and the Seller.

(d) *Red Passenger Tubes.* This grade shall be strictly *red* tubes.

(e) *Black Passenger Tubes.* This grade shall be strictly black compounded passenger tubes. Black rubber valve cots and their bases may be present, but no metal valves or parts.

(f) *Mixed Passenger Tubes.* This grade shall consist of whole tubes of various colors and qualities and may contain valves unless otherwise specified in the purchase contract.

4. *Truck Tubes.* Shall consist of inner tubes for pneumatic truck and bus tires free from crusty, oxidized or puncture-proof tubes, metal and punchings. Sections of tube less than 12 inches long are not good delivery. All truck tubes, except (a), Mixed Truck Tubes, shall be free from metal valves and from black rubber valve cots and the bases of such valves unless otherwise specified in the purchase contract.

(a) *No. 2 Truck Tubes.* This grade shall consist of compounded truck tubes free from black, red and two-toned tubes.

(b) *Red Truck Tubes.* This grade shall be strictly *red* tubes.

(c) *Black Truck Tubes.* This grade shall be strictly black compounded truck tubes. Black rubber valve cots and their bases may be present, but no metal valves and parts.

(d) *Mixed Truck Tubes.* This grade shall consist of whole tubes of various colors and qualities and may contain valves unless otherwise specified in the purchase contract.

5. *Solid Tires.* This grade shall consist of solid motor truck tires over 2½ inches in width free from oxidized tires, industrial truck tires, metal, hard bases, fiber bases, and cloth bases.

6. *Bicycle Tires.* This grade shall be free from hard and oxidized tires, wire and beaded tires, and shall be free from metal valves.

7. *Shoes.* Shoes shall consist of rubber boots and shoes of United States or Canadian manufacture free from foreign material and leather and any composite non-rubber material.

(a) *Black Shoes.* This grade may contain in addition to strictly black boots and shoes other varieties as white or colored shoes, colored soles, heels and soles from which the uppers have been removed, arctics, and tennis shoes, subject to purchase agreement as to sorting and as to price differentials covering the specific varieties present in the shipment.

(b) *Arctics.* This grade includes cloth top shoes and gaiters and light all-rubber gaiters. If the purchase contract specifies trimmed arctics, the material shall be free from metal. If the purchase contract specifies strictly black arctics, the material shall be free from white or colored shoes and light all-rubber gaiters.

(c) *Tennis Shoes.* This grade shall be free from leather or composition soles.

8. *Hose.* Hose shall be free from metal, rags, rope, hard or oxidized hose and cotton covered hose.

(a) *Airbrake Hose.* This grade shall be strictly airbrake hose free from steam or any other kind of hose.

(b) *Garden Hose.* This grade shall be strictly garden hose except that non-oxidized steam hose may be included. All-rubber hose containing no fabric insertion is not acceptable.

9. *Special Classifications.* Scrap Rubber of a character not described by the specifications for standard grades is a special grade subject to specification by the Buyer. Such scrap shall be clean, free from cloth, metal and other foreign material, and from crusty, hard, or oxidized material. It shall be equal in all respects to the sample submitted.

RECLAIMED RUBBER

THE demand for reclaimed rubber in June was less heavy than in May, and indications are that second quarter consumption will total less than for the first quarter of the year. The present supply is termed adequate for the demand. Although some reclaiming plants are handling both neoprene and GR-S scrap, the present demand for these reclaimed synthetics is not large. Recently released statistics reveal that in 1943, 106.5 pounds of reclaimed rubber were used for every 100 pounds of natural and synthetic rubber in all products, compared with 29.3 pounds of reclaim per 100 pounds of natural during 1940.

Reclaimed Rubber Prices

	Sp. Grav.	¢ per Lb.
Auto Tire		
Black Select	1.16–1.18	6½/ 6¾
Acid	1.18–1.22	7½/ 7¾
Shoe		
Standard	1.56–1.60	7 / 7¼
Tubes		
Black	1.14–1.26	11¼/11½
Gray	1.15–1.26	12½/13¼
Red	1.15–1.32	12 /12¼
Miscellaneous		
Mechanical blends	1.25–1.50	4½/ 5½
White	1.35–1.50	13½/14½

The above list includes those items or classes only that determine the price bases of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

Auburn Rubber Expanding

Auburn Rubber Corp., Auburn, Ind., is now installing new machinery and equipment as part of a modernization and remodeling program, to further war production at the request of the Office of the Rubber Director and to meet the urgency of increased production. The Auburn firm had planned, in 1942, a five-year modernization schedule as a postwar project, to consist of modern equipment and new buildings to increase efficiency and capacity. But the war emergency made necessary immediate implementation of the program and installation of new equipment. This expansion will increase in tonnage about twice the Auburn firm's past capacity and will consist primarily of additional mixing and milling machinery, new presses, tubing equipment, and devulcanizing apparatus. If delivery promises are kept, it is hoped this equipment will be in production by September 1, and it is being so planned that no appreciable shutdown will be required to make installation.

The after-the-war part of the program will consist of a new office building, new and modernized laboratory, new factory offices, employes' rest and shower rooms, extension of the boiler room, and the revamping of the compounding material handling methods in general. This modernization and remodeling program was begun in 1942, and the whole program will probably be in process some each year for the next three or four years.

Auburn Rubber Corp. began as the Double Fabric Tire Co. in 1910 with the manufacture of tire repair materials, notably blowout patches and interlocks. This grew into rubber tires of square-woven fabric and from that to cord tires and tubes and later was followed by the production of shoe finding rubber items and rubber toys. During the present war program Auburn has been producing molded mechanical items and Army half soles.

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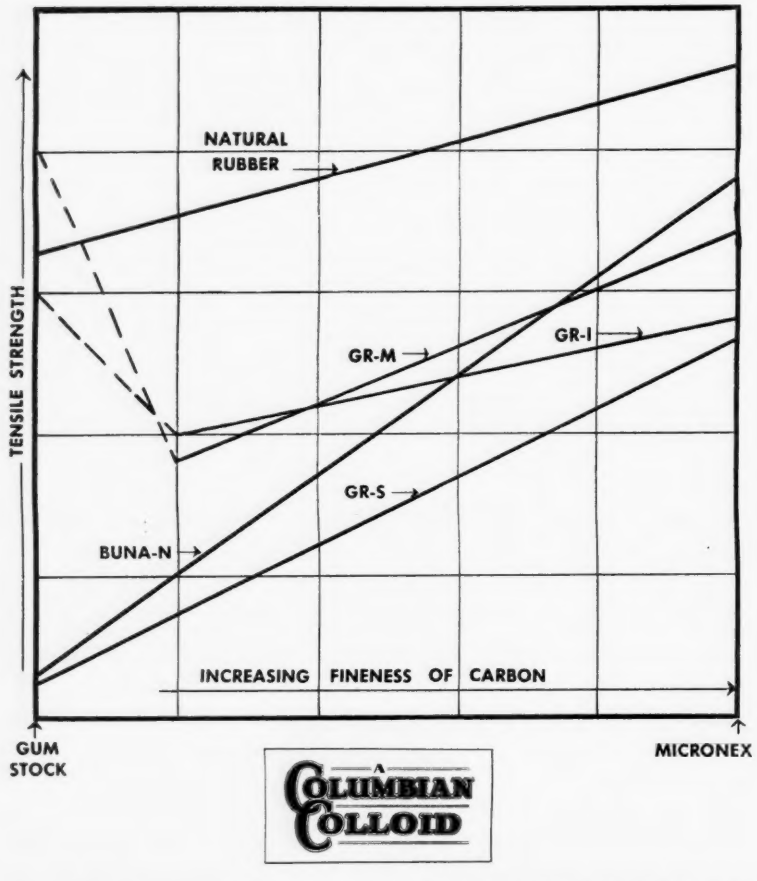

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EDITORIALS

Opportunity Knocks But Once

"OPPORTUNITY knocks but once."

So said Rubber Director Bradley Dewey, speaking at the University of Akron on June 4 on the subject of "Synthetic Rubber and the University of Akron—Now and in the Future." In this talk, which had as its purpose placing emphasis on the need of Akron and the University of Akron to realize the opportunities for research, development, and cooperative effort opened up by the wartime synthetic rubber program, the Rubber Director by changing a few words could just as well have directed the same remarks to the country as a whole and the rubber industry in particular.

"The future of the rubber industry appears as bright as any that can be mentioned and far above the average. It is quite probable that the new synthetic industry, which has matured so rapidly under the stress of war, will prove almost as great a stimulus to the industry's future progress as did the advent of the popular priced automobile."

These were the tenor of the remarks made by R. P. Dinsmore, vice president of the Goodyear Tire & Rubber Co., before the National Association of Purchasing Agents in New York, N. Y., on May 30.

There is little doubt that events of the last decade and especially since our entry into the present world conflict have done much to contribute to the very rapid growth of the rubber industry, while at the same time setting the stage for the development of the United States as not only the world's greatest consumer, but also as the world's greatest producer of rubber. We are, for the present at any rate, in the strong position of controlling both the major producing as well as consuming centers for this important world commodity, and by virtue of this position we are also probably learning faster than anyone else how best to use synthetic rubbers either alone or in combination with natural rubbers.

It is true that skeptics may say: How long after natural rubber again becomes available from the Far East will the United States be able to retain its position as the major producer when faced with competition from the lower cost natural rubber?

Many answers to this question have already been made, but some statements put forth recently before members of Congress by the Rubber Director are quite pertinent in this connection. He said:

"The world production of rubber in 1941 was getting pretty close to the capacity of the then-existing plantations. If you leave a plantation alone in the jungle for two years and then go back to find it, you will have to take a machete and hack through the jungle to find where the rubber trees are. It will cost a lot of money to recover those plantations. . . ." Continuing the Rubber Director pointed out: "If you were a capitalist, and you had to invest a lot of money to clear off the jungle and plant a plantation and wait seven years before you got the first crop, and you did not know anything about labor costs, and you saw a big new chemical industry that was only three years old that had already pulled the cost of synthetic rubber from 40 or 50¢ a pound down to 12¢ a pound, I wonder if you would want to put your money into that and wait seven years, or say let the chemical industry have some of the business."

If it may be reasonably assumed therefore that the United States and the United States rubber industry stand an excellent chance of maintaining world leadership in rubber for the next decade at least, what are we going to do about this situation? Are we going just to accept the good fortune that has come to us, take profits and business as long as they last, and, when they begin to decline, start to blame government or individual industry leaders for their lack of foresight in not taking the necessary steps to prevent our losing this leadership? It seems very probable that this will not be the case. There was formed in Washington recently an advisory committee on rubber by the State Department which lists among its members top executives of rubber manufacturing companies and government agencies having to do with the present rubber program. Although the activities of this committee are reported to be centered mostly about outlining the sort of study needed for the discussion of economic problems, this study will of necessity take into account happenings all over the world and their effect on the rubber industry in this country. Through this committee, then, or any other organized industry-government group we could make a start of thinking of the future of the rubber industry in terms of maintaining it as the world leader in the field at the same time at least as individual members of the industry think in terms of maintaining any particular company as a world leader in this field. Opportunity does often knock but once, and in this case all of the several hundred companies in the rubber industry certainly are in a position to benefit to a greater extent and for a more extended period by thinking in national terms as well as in company terms, in more or less the same way that they have found it necessary to do during this war period.

Reasoning along the above lines inevitably arrives at a point where consideration must be given to just how far a business enterprise should be willing to go in contributing to the national welfare under peacetime conditions. At the same time it is necessary that a definite statement of policy be made by government as to just how much business organizations may cooperate for the common good. Many arguments both *pro* and *con* have been presented on the subject, but in order to maintain international leadership in any industry it will be difficult to continue our policy of spasmodically enforced absolute competition while other countries make more and more progress toward industrial integration.

Scientific and Technical Activities

Dinsmore Projects Postwar Rubber Production

THE National Association of Purchasing Agents held a series of war conferences at its annual convention at the Waldorf-Astoria Hotel, New York, N. Y., May 29 to 31. About 200 purchasing agents from the United States and Canada were present at the discussion of vital present and reconversion problems.

S. D. Kirkpatrick, editor of *Chemical and Metallurgical Engineering*, speaking to the Chemical and Allied Buyers' Group on May 29, predicted that the long-term trend for chemical prices would be downward because of increased production and lowered cost unit as a result of improved processes made possible by research. The addition of new products through the injection of new competitive influence is also a factor in lower price trends, he stated.

R. P. Dinsmore, vice president in charge of research and development of The Goodyear Tire & Rubber Co., predicted at a general session May 30 that between midsummer and autumn rates of production of rubber and rubber goods will come into reasonable balance which will bring the rubber crisis close to an end. Speaking on "Looking Ahead in the Rubber Industry," Dr. Dinsmore predicted an estimate of rubber requirements of the United States through 1948, and of world rubber supply and demand through 1950 based on the "assumption that the war will be essentially completed by a United Nations victory by the end of 1946."

The total potential postwar capacity of Far East crude and United States synthetic rubber was estimated by the speaker at 2,675,000 long tons. In addition he said there was about 200,000 tons of synthetic production capacity in Germany, Russia, Italy and elsewhere. The scientist set the highest world consumption at 1,104,000 tons in 1937 and the highest United States consumption as 783,000 tons in 1941. The following table prepared by Dr. Dinsmore indicates comparatively postwar supply and demand.

TOTAL WORLD RUBBER SUPPLY AND DEMAND
Long Tons

	1947	1948	1949	1950
Demand	1,526,500	1,701,000	1,900,000	1,900,000
U. S. A. Synthetic Production	1,075,000	1,075,000	1,075,000	1,075,000
Rest of World Synthetic Production	150,000	150,000	.....	.....
Plantation Production	400,000	700,000	1,100,000	1,500,000
Wild Rubber	50,000	40,000	25,000	25,000
TOTAL SUPPLY	1,675,000	1,965,000	2,200,000	2,600,000
Deficit or Surplus	148,500	254,000	300,000	700,000
Required for inventory and in transit	200,000	200,000	100,000	

Considering the postwar plantation situation in the Far East, Dr. Dinsmore pointed out that small native estates will be the first to produce because of simple equipment.

"The reorganization of labor and replacement of equipment on large estates will be a difficult and tedious job," he said. "The attitude of the natives may be uncooperative, and international disputes are not unlikely. It is expected that after complete repossession the first year will not produce over 400,000 tons of rubber and the second year not more than 700,000 tons. It may require two more years to reach 1,500,000 tons output. The world may be facing a tight rubber situation for nearly four years after the war, unless we see fit to expand further our synthetic output."

This view, the speaker remarked, was quite different from the one frequently expressed that the postwar market will be flooded with cheap crude that will supplant synthetic. Dr. Dinsmore's assumption allows for synthetic rubber five or six more years in which it can become competitive in cost and quality with natural rubber. But he warned that if consumption of synthetic is to attain the indicated figure, large quantities of many necessary materials must be available after the war period.

"Such items as carbon black, rubber accelerators and rayon fabric are used in greater quantities with synthetic than with natural rubber," he said. "In some cases the productive capacities are inadequate or are being supplied on an emergency conversion basis. Manufacturers of these materials have been reluctant to plan permanent expansions in view of the general belief that they would be superfluous after the war. Such manufacturers and their customers would do well to reconsider the whole situation in the light of a more permanent demand."

In a comparison of natural and synthetic rubber costs Dr. Dinsmore predicted higher plantation labor and management costs and an increase in local taxes which would increase the price of natural rubber from 2¢ to 4¢ a pound. This would mean a cost of from 13¢ to 15¢ a pound for crude in New York. With plant values adjusted to postwar replacement costs, synthetic rubber could be produced for 15½¢ a pound. It is estimated that by efficient methods styrene and butadiene can each be produced for less than 8¢ a pound. While it may be important to retain two basic sources of butadiene supply, that is, alcohol and petroleum, both from the point of view of butadiene plant equipment now in use and future economics, Dr. Dinsmore said that West Indies molasses was the cheapest source of industrial alcohol, and that with by-product utilization this source of butadiene appears to be competitive with petroleum and perhaps cheaper.

"The synthetic process of obtaining rubber is capable of being changed quickly and relatively cheaply. It seems certain that synthetic will check wild price fluctuations and tend to create a progressive decline in rubber prices," Dr. Dinsmore stated.

Considerable increases were forecast for United States consumption of rubber in mechanical goods and footwear production, and for other continued prewar and new civilian uses. The following table by Dr. Dinsmore indicates potential requirements for various classes of rubber goods, based on known shortages.

The passenger-tire requirement is based upon the following estimated tire requirements:

PASSENGER TIRE PRODUCTION

	Original Equipment	Renewals
1945	10,000,000	30,000,000
1946	20,000,000	40,000,000
1947	30,000,000	50,000,000
1948	37,500,000	40,000,000

The civilian truck-tire requirement is based upon the following estimates:

TRUCK TIRE PRODUCTION

	Original Equipment	Renewals
1945	600,000	8,000,000
1946	1,800,000	10,000,000
1947	3,000,000	10,000,000
1948	5,400,000	8,000,000

Categories other than tires in which demand will be heavy, the scientist declared, are rubber spring suspensions to replace steel springs for automobiles, vibration dampeners for industrial machinery and railroad trains, latex sponge rubber for cushioning furniture, vehicle seats, and mattresses, and rubber as a base for lacquer, adhesives, plastics, and packaging materials.

In conclusion Dr. Dinsmore said, "It is quite probable that the new synthetic industry, which has matured so rapidly under the stress of war, will prove almost as great a stimulus to the industry's future progress as did the event of the popular-priced automobile. Even under adverse social conditions, this industry should progress better than many another less flexible or less firmly rooted in the economic needs of the world."

The J. Shipman Gold Medal for distinguished service to the advancement of purchasing was awarded at the annual banquet May 30 to Frederick W. Russe, director and vice president of the Mallinckrodt Chemical Works, St. Louis, Mo. Charles L. Sheldon, Hood Rubber Co., Watertown, Mass., was elected a vice president of the purchasing organization. J. Anton De Haas, William Ziegler Professor of International Relationships, Harvard University, addressed the dinner meeting on "This Scrambled World."

"While our businessmen are fed up with government control," he said, "it seems most unlikely that a so-called free competitive system can be established soon after hostilities cease. If we are to avoid confusion and dislocation of industry, the process of industrial demobilization must take place according to a carefully worked out and government controlled plan."

RUBBER REQUIREMENTS

	1945	1946	1947	1948
Passenger tires	221,400	330,800	440,000	424,000
Truck and bus tires	233,300	260,000	286,000	296,000
Mechanical goods	35,000	60,000	80,000	100,000
Footwear	15,000	30,000	40,000	40,000
Other civilian uses	10,000	30,000	80,000	150,000
Military	400,000	210,000	.....	.....
Export	150,000	150,000	.....	.....
	1,064,700	1,070,800	926,500	1,010,000
U. S. A. Civilian	514,700	710,800	926,500	1,010,000
Military	400,000	210,000	.....	.....
Total	914,700	920,800	926,500	1,010,000

Fisher Relates Production Problems in Rubber from Oil

ADDRESSING the North Jersey Section, American Chemical Society, at Newark, N. J., May 8, H. W. Fisher, manager of the chemical products division, Standard Oil Co. of New Jersey, stressed the role of applied chemistry in the synthetic rubber program. His topic was "Progress in Rubber from Oil." Mr. Fisher recalled that the technical foundation for synthetic rubber was laid down before the war, and with the rapid advance of the Japanese forces into the Pacific rubber lands a detailed program was formulated, contracts let, and construction begun by the Rubber Reserve Co. working with American industry.

Two of several practicable processes developed by Standard Oil for making butadiene from petroleum hydrocarbons proved to be applicable to war conditions. One produced the desired butadiene and a number of co-products by the thermal cracking of liquid petroleum fractions. But for the large-scale production necessitated by the war it was recognized that the best possibility of making butadiene was by hydrogenation of butylene, either by using chlorine or preferably by direct removal of hydrogen. The development of the catalytic cracking process in 1940 assured enough butylenes for the required butadiene. It had been found that direct dehydrogenation could be achieved by passing butylene over a special catalyst at high temperature, and at sub-atmospheric pressure. Operation at pressures below atmospheric for large-scale production presented extraordinary difficulties. Much heavy and complicated equipment involving difficult structural problems was needed. Air leaks into the vacuum vessels operating at high temperatures with potentially explosive gas inside must be prevented. Another method of obtaining low-pressure conditions was to dilute the butylene with another gas. Steam was selected because of certain advantages. But all known suitable catalysts were rendered inactive by steam.

After a year's research a material containing four components was found. This catalyst is currently in use for the production of all the butadiene made directly from butylene. Plants designs for operation with a true vacuum, which had been carried forward as an alternate method, were scrapped, and designs for dehydrogenation with steam dilution were made. Construction of a full-scale plant was authorized in July, 1941. Thus a process for making butadiene in enormous quantities was available when natural rubber resources were cut off in December of that year.

Paying tribute to the distilling industry, whose 1944 production of industrial alcohol will be six times as large as in the average prewar year, Mr. Fisher said that actually the controversy as to whether butadiene for the federal rubber program should be made from alcohol or petroleum was never between the oil and chemical companies who developed the two processes. They agreed from the beginning the practical solution was to use both methods. However it was discovered, Mr. Fisher stated, that successive identical alcohol to butadiene plants could be constructed more quickly than petroleum to butadiene plants.

The Standard of Louisiana plant (the prototype butylene dehydrogenation plant) was given top priorities along with alcohol plants, and in May, 1943, the plant was at design capacity. Except for normal turnaround to change catalysts, the plant has operated continuously. Gradual increases in capacity have raised the output to 140% of design. Five units almost identical to the one at Baton Rouge are now in operation.

The latter portion of Mr. Fisher's talk concerned production of butyl rubber. In the manufacturing process the raw material mixture is about 97-98% isobutylene and 2-3% of a diolefin such as isoprene. The mixed raw material is diluted with an inert and low-freezing point solvent. The exothermic reaction takes place at about —150° F. The polymer is formed almost instantaneously with the injection of the catalyst. An extremely delicate balance of all operating variables is required to assure that the rubber will be formed and kept in a distinct slurry of uniform and moderate particle size. Large quantities of heat must be removed at a very low level in order to maintain the proper reaction temperature. Any tendency of the polymer to contaminate the heat transfer surface of the reactor quickly causes trouble by decreasing the transfer coefficient. If the particles agglomerate to the size of golf balls or larger, the lines are fouled. The slurry of polymer in diluent at —150° F. must be converted to a slurry of polymer in water at +150° F., still maintaining particles small enough to pump, but large enough for filtering.

The Baton Rouge plant has been used for experimental work which developed improvements in the process such as a different reactor design, modification of the filtering of the water slurry, and changes in drying and finishing techniques. Thus, Mr. Fisher declared, the butyl produced today is a far better synthetic rubber than was anticipated at the outset of plant construction two years ago. Improvement in cure rate has been gained, and in typical production molding cure time is only 25% longer than for natural rubber. Two years ago it took twice as long.

The finished plants are producing at a rate of about 15,000 tons a year. Tire inner tubes and proofed goods are in regular production for military use. Butyl is the only rubber permitted in the making of military tubes for 15- and 16-inch drop-center rims. Soon tubes 10 inches and larger, now made of natural rubber, will be made from Butyl. Other tube sizes between these extremes, now made from GR-S, will likely be made of Butyl because of its better quality.

Fabrication problems have been solved, and all major manufacturers are making Butyl tubes on regular production schedules. This has been accomplished with no special equipment or changes in technique. Butyl tubes have been cured in six minutes, compared with five for natural rubber. Mr. Fisher emphasized that Butyl tubes have been definitely proved useful. On the basis of quality they have possibilities of replacing natural rubber tubes, he said. The impermeability of Butyl appears in tubes by reducing the frequency of inflation. Its ability to hold air better than natural, GR-S, and neoprene tubes has been demonstrated. For tires, Mr. Fisher said in closing, GR-S continues to be the best synthetic available.

Tests for Behavior of Carbons in Rubber Reported

THE New York Rubber Group met May 26 in the Building Trades Club, 2 Park Ave., New York, N. Y., with 228 members and guests present. The afternoon technical session was devoted to a paper, "The Carbon Spectrum for the Rubber Compounder", by C. W. Sweitzer and W. C. Goodrich, of Columbian Carbon Co., Brooklyn, N. Y., and to a discussion of "The Heat Problem in GR-S Carcass Stocks" by J. G. Hendricks, National Lead Co., Brooklyn. An abstract of the paper on the carbon spectrum is given below; while the complete paper by Mr. Hendricks will be found on pages 409-11 of this issue.

"The Carbon Spectrum for the Rubber Compounder." Rationalization of the colloidal carbon effects in rubber can be accomplished through a recognition of the fundamental properties of colloidal carbons, an appreciation of the effect of these properties on the behavior of carbons in rubber compounds, and an evaluation of them by simple non-rubber tests. The carbon spectrum includes the gamut of available colloidal carbon types and grades. The behavior of these in rubber can be satisfactorily explained on the basis of surface (a measure of particle size and the total surface available for reenforcement), pH (clue to the chemical activity of the carbon surface), and structure (the measure of agglomeration in carbons and the degree of its persistence). The rubber compounder can extend the versatility of colloidal carbons to give new effects and standards of performance by an understanding of these fundamental properties. Surface is the dominating influence in GR-S as well as *Hevea*. Rebound in both is dominated by surface. Tensile and energy are also dominated by surface except for the anomalous behavior of structure carbons. Modulus in GR-S is influenced by surface. The rate of cure in both *Hevea* and GR-S is dominated by pH. Retardation is given by low pH, and acceleration by high pH carbons. In GR-S total surface may, in some cases, equal pH in its cure effect. Structural effects in *Hevea* and GR-S appear in processing, modulus, and hardness. Normal structure is associated with the standard reenforcing carbons. Supernormal structure gives higher modulus and hardness than expected on the basis of surface; while subnormal structure results in somewhat lower modulus and hardness values. Surface values can be closely estimated by a mineral oil color test.

Using anchor points provided by the electron microscope, surface values on unknown carbons are obtained on a color surface graph. Correlation of color with rebound is excellent. The availability of total surface is estimated by a tinting strength test. Considering other factors that influence tensile, the correlation of tinting strength with tensile is good. Measured on a carbon-water slurry, correlation of pH with rate of cure is good, particularly where alkali accelerators are used. Correlation of structure with modulus, evaluated by an oil absorption test, is good considering the effect of compounding and cure variables. Electrical conductance of carbons in rubber compounds can be assessed with a fair degree of accuracy by a simple dry resistivity test on the original carbon. In order, decreased volatile, finer particle size, and increased structure improve conductance properties of carbon.

A cocktail hour and dinner were followed by music and a floor show and the motion picture, "Synthetic Rubber," which was produced by the United States Bureau of Mines in cooperation with the Goodyear Tire & Rubber Co., Akron, O.

One Thousand Attend Canadian Chemical Conference

THE twenty-seventh annual Canadian Chemical Conference, held in the Royal York Hotel in Toronto, Ont., on June 5, 6, and 7 under the auspices of the Canadian Chemical Association, The Canadian Institute of Chemistry, and the Canadian Section of the Society of Chemical Industry, established a new record for attendance in that more than 1,000 members and guests of the three scientific societies were registered. This is more than twice as many persons as have been registered at any previous Canadian conference. Another feature of this meeting was the approval by the councils of the three societies of the amalgamation of all the chemical societies in Canada into the Chemical Institute of Canada, as this action was found to be in accordance with the desires of more than 1,600 Canadian chemical engineers and chemists as the result of a survey conducted earlier in the year.

Technical Session on Rubber Held

The rubber technical session sponsored by the Ontario Rubber Section of the Canadian Chemical Association was held June 6 and was devoted to the presentation of four papers on synthetic rubbers by leading rubber technologists. The chairman of the Ontario Rubber Section, J. Ramsay, presided.

E. A. Roberts, of Firestone Tire & Rubber Co., Akron, O., who had been loaned to the WPB and the Army Air Corps as a tire consultant, presented the first paper, entitled "125,000 Miles as Tire Consultant for the Allied Air Forces." Mr. Roberts discussed airplane tire engineering and service problems encountered in all parts of the United States and in Alaska, England, India, and aboard an aircraft carrier, after giving a review of major developments such as tread design, cord fabrics, bead construction, the use of synthetic rubbers, etc., that have taken place in airplane tires during the past few years. Mr. Roberts reported that it was found that airplane tires manufactured in England weighed 70% more than tires of the same load carrying capacity made in the United States, owing mostly to the use of long-staple cotton instead of rayon in the cord fabric. British manufacturers found it necessary to adopt the American construction in making tires for American planes, and as a final outcome, they have now adopted rayon cord for many of the tires for British planes. Because of the great saving in shipping space of not having to send tires to India and the additional saving in the elimination of the shipment of a certain tonnage of rubber from Ceylon, the manufacture of airplane tires in India has been accomplished despite very great difficulties, it was said. A discussion of service problems, such as inflation, storage, repair, and retreading, concluded Mr. Roberts' paper.

The next paper was "The Properties of Synthetic Rubber and Their Effect on Vibration Characteristics" by J. D. Morron and others of the United States Rubber Co., Detroit, Mich. The results of work planned to study the effect of temperature and especially sub-normal temperature on the vibration characteristics of rubber, with emphasis on the different types of synthetic rubbers and including descriptions of a number of especially built pieces of testing equipment, were presented. An apparatus, known as a shear resiliometer by which it was possible actually to measure the amount of vibration transmitted through a mounting under varying temperature conditions, was designed and built. Natural rubber was shown to have marked superiority over any of the synthetic rubbers as a vibration insulator when all were tested at temperatures from 30° F. to —40° F. Although rubber mountings exposed to low temperatures warm up under vibration, it was revealed that there was a definite temperature below which a mounting will not warm up no matter how long it was vibrated. Natural rubber in a 40 durometer stock in the shear resiliometer will warm up at temperatures just above —40° F.; while other elastomers have a much higher warming up, or "barrier" point as it was called, and thus become ineffective as vibration insulators at a much higher temperature than natural rubber. It was stated in conclusion that the only laboratory method that design engineers can use to obtain information in their work of substituting synthetic for natural rubbers in vibration insulators is one which uses special equipment that actually shows the percentage transmission of vibration.

B. S. Garvey, Jr., of The B. F. Goodrich Co., Akron, discussed "Softeners in Synthetic Rubbers." Since it is generally necessary to use more softener with synthetic rubbers than with natural rubber, to get the same effect on processing, the effect of the various softeners on the final properties of the compound becomes more significant, Mr. Garvey said. The solubility relations of a large group of liquids covering a wide range of chemical composition were determined for GR-S and Hycar OR rubbers. The properties of boiling point, melting point, and viscosity of softeners and the importance of a consideration of the specific values of these properties with regard to their effect on the final rubber compound were also considered. The results of compounding studies in which the same amount of a great variety of materials was added to a base compound and the variation in tensile, modulus, elongation, hardness, rebound, etc., was determined for Hycar OR and GR-S rubbers, were given. From these data the effect of the various types of softeners classified according to solvent or lubricating type action and further classified according to chemical or technical composition, that is, hydrocarbons, esters, factices, asphalts, coal tars, etc., on processing and compound properties was tabulated and described. Mr. Garvey pointed out in conclusion that the effect on rate of cure makes the evaluation of softeners complicated and that specific data presented were taken from a study on a single base compound and hence must be interpreted and followed up by additional studies for thorough evaluation. In the final analysis the best softener for any particular purpose is the one that gives the best balance of properties for that particular use, he said.

The final paper, "Derivatives of Synthetic Rubber," was given by H. A. Endres, of the Goodyear Tire & Rubber Co., Akron. A résumé of the development and uses of derivatives of natural rubber by the processes of cyclization, chlorination, and hydrochlorination was first presented; then the speaker described several derivatives made recently from synthetic rubbers which indicate that many of the desirable features possessed by the derivatives of natural rubber can be duplicated in the synthetic products. The properties of chlorinated GR-S as prepared in the Goodyear research laboratory were given in some detail as were the process and properties of cyclized GR-S. The chlorinated GR-S was reported more flexible than chlorinated natural rubber; while the low moisture vapor transmission of the cyclized GR-S was considered as suggesting its use in moistureproof coatings for paper. The use of the latter material as an ingredient in moisture, alkali, and acid resistant paints and as a reenforcing agent in GR-S wire coating compounds was also thought to have promising possibilities. It was further pointed out that field of usefulness of the synthetic derivatives will be extended by the selection of the proper type of synthetic rubber for cyclization, chlorination, and hydrochlorination to bring out certain desirable characteristics not inherent in products made from natural rubber.

Papers before Other Sessions

In "Future of Plastics" before the Canadian Institute of Chemistry, Willard H. Dow, president of the Dow Chemical Co., Midland, Mich., prophesied that plastics will be used after the war in many places where they are now considered stop-gaps. Monomer purity was emphasized as an essential factor for the manufacture of both plastics and synthetic rubbers. Continuous polymerization was considered an aid in obtaining uniformity of polymers, and new types of equipment are required to make large sections of plastics products, it was said. The wide spread in price between the cost of the manufacture of the polymer and the cost of the finished plastic product is all out of proportion, Mr. Dow said, and thus preventing the greater use of plastic materials.

Gustav Egloff, of Universal Oil Products Co., Chicago, gave a paper before the Society of Chemical Industry on "Petroleum as a Chemical Industry", in which he stated that petroleum will surpass coal tar as a source of hydrocarbon chemicals. Butadiene from petroleum will be the major source of this material for synthetic rubber in the postwar period, and plantation rubber will eventually be replaced by synthetic rubber, according to this speaker.

G. S. Whitby, of the University of Akron, also gave a paper before the Society, "Polymerization." Addition polymerization and condensation polymerization were discussed. Very little has been done in condensation polymers, and Dr. Whitby said that this field will doubtless be developed to a much greater extent in the future. Reference was made to the fact that in this type of reaction, strong polar forces between molecules produce fibers; while weak polar forces between molecules give rubber-like substances.

A. P. S. Meets

A MEETING of the American Physical Society was held at the University of Rochester, Rochester, N. Y., June 23 and 24 at which time the inaugural meeting of the new Division of High Polymer Physics, featuring a program of about twenty papers on the elasticity, viscosity, and other physical properties of rubbers and other high-polymeric materials, took place.

It is hoped that abstracts of the papers presented and an account of the meeting of this new Division can be prepared for publication in the August issue of INDIA RUBBER WORLD.

Vulcan Proofing Co., Brooklyn, N. Y., has announced the appointment of Vally N. Braden, recently superintendent of the balloon and airship division of the Goodyear Tire & Rubber Co., Akron, as manager of design and production. Mr. Braden has been with the Goodyear company in various executive capacities since 1917.

Postwar Car Designs Forecast

DESIGN changes in postwar automobiles were described by Brooks Stevens, industrial designer of Milwaukee, Wis., and W. B. Stout, of Stout Research Division, Consolidated-Vultee Aircraft Corp., Detroit, Mich., at the concluding session of the national war materiel meeting of the Society of Automotive Engineers, Inc., in the Book-Cadillac Hotel, Detroit, on June 7.

"Any automobile even bordering upon the revolutionary must be a post-postwar model," Mr. Stevens said.

Plastic cars for $400 and privately owned helicopters within the automobile price range will not be available the day after victory, he stated. Smaller, lighter cars to meet rising costs and taxes, but with increased space and comfort will appear.

"Adequate reasons for rear-mounting of engines may be found; otherwise design details probably will follow the sound 1930-40 engineering trend," he suggested.

Transparent "goldfish bowl" bodies were characterized as too revealing, too hot, and difficult to repair.

Mr. Stout asserted that it was his belief that a flyable automobile will appear before a roadable airplane. A good city automobile that can be driven to and from work five days a week and driven week-ends to an airport, wings put on, and flown 1,000 miles will be the first step, he said, and such a car must have regulation motor car transmission, brakes, tires, etc., such as fit road problems.

Vodra Discusses GR-S Cure

ABOUT 40 members and guests attended the meeting of the Northern California Rubber Group, May 25, at the Hotel Claremont, Berkeley, Calif. V. H. Vodra, sales representative of R. T. Vanderbilt Co., Inc., gave an illustrated lecture on the action of Cumate and Cuprax in speeding GR-S cure rates. H. J. Jordan, technical sales representative of E. I. du Pont de Nemours & Co., Inc., presented selected matter from papers presented at the recent spring meeting of the Division of Rubber Chemistry, A. C. S., and discussed the action of Permalux in tread stocks.

The recent death of Charles H. Bean, owner of the Bean Tire & Rubber Works, San Jose, Calif., and a member of the Group was announced.

A refrigerator deodorizer donated by the New Jersey Zinc Co. was won by Mr. Jordan. Table favors were the gift of George Steinbach, of H. M. Royal, Inc.

Emulsifying Agent

THE properties of Bemul, a white, nontoxic glyceryl monostearate in bead form, suggests its usefulness to manufacturers of foodstuffs, cosmetics, and pharmaceuticals as well as its availability as an emulsifying agent in the polymerization of synthetic rubber, and to prevent tacking between sheets of rubber. Recently introduced by The Beacon Co., 97 Bickford St., Boston, Mass., Bemul is completely dispersible in hot water and completely soluble in hot alcohols and hydrocarbons. It has a pH (3% aqueous dispersion at 25° C.) of 9.3 to 9.7, and melts at 58° to 59° C., (capillary tube). The viscosity of its emulsions vary from a thick cream to a thin liquid, depending upon the solid concentration. It may also be used as a suspending agent for organic or inorganic materials in aqueous solutions.

Heat-Resistant Thermoplastic Requires No Plasticizer

A THERMOPLASTIC that holds its shape and strength in boiling water, and which can be injection molded by fast, economical methods was recently announced by Monsanto Chemical Co., St. Louis, Mo. Known as Cerex, this copolymer containing carbon, hydrogen, and nitrogen, has an A.S.T.M. heat distortion point of 220° F. The three elements it contains, carbon, hydrogen, and nitrogen, may be combined in different copolymers to give various characteristics, but the present war development is concentrated on Cerex X214 which appears to overcome such shortcomings as poor dimensional stability and low heat resistance apparent in present thermoplastics. The heat resistance of Cerex X214 is not accompanied by the necessity of higher molding temperatures, and the resin requires no plasticizer for formulation into moldable compounds. The water absorption gains on American Society for Testing Materials test is 0.3%.

Tests have indicated that flexural strength of the thermoplastic is about 13,000 pounds per square inch. Electrical properties are said to be superior to those of most other thermoplastics, but not so good as polystyrene at very high frequencies. The dielectric strength is more than 500 volts per mil. Surface and volume resistivity are not appreciably affected by prolonged immersion of the material in water. The low water absorption of Cerex helps to maintain its electrical properties under high humidity conditions. Acid and alkali resistance are indicated by tests in which boiling sulphuric acid did not affect the thermoplastic. Parts molded of Cerex withstood conditions that corroded enameled steel and attacked the surface of aluminum.

The material now being produced has a transparent amber color. Color possibilities in molding compounds are somewhat limited, but a range of transparent, translucent, and opaque colors can be obtained. The material is rated, in flammability tests, as slow burning. Produced for some time on an experimental basis, the plastic has also found wide use in Radar, radio, and other military electronics equipment where lightweight substance with great heat-resistance properties are needed. Potential civilian applications include surgical instruments, sanitary ware, restaurant serving dishes, and medicinal packages that must be sterilized by steam or boiling water. Other possible applications include business machines, automobile and aircraft parts, electrical, chemical, photographic, and optical equipment, and household items.

Styramic HT, a specialized high-cost material of critical importance in super high-frequency insulation, has properties similar to Cerex. A secrecy order forbids discussion of its properties.

Paraplex X-100

PARACON,[1] a synthetic rubber for specialty purposes, which was developed by the Bell Telephone Laboratories as a by-product of research on insulating materials, is now commercially manufactured by the Resinous Products & Chemical Co., Philadelphia, Pa., and distributed as Paraplex X-100. This elastomer can be vulcanized with benzoyl peroxide to produce stocks with good tensile strength and elongation, and excellent resilience, oil resistance, and aging properties.

[1] India Rubber World, May, 1943, p. 150.

Dispersing Agent for Pigments

TAMOL R, the neutral sodium salt of a complex condensed organic acid, is reported an efficient and economical dispersing agent. It is a light tan, free-flowing granular material, readily soluble in water and insoluble in oils. The chemical has been recommended as useful in the dispersion of carbon blacks and other pigments used in compounding rubber latices and for other industrial purposes.

Tests are said to have proved that Tamol R shows only a moderate lowering of surface and interfacial tensions. It is not a good wetting or emulsifying agent. Under proper conditions Tamol R will assist in promoting dispersion, but of more importance, it will, it is claimed, effectively maintain the degree of dispersion. Forces are exerted on the individual particles so that they are repelled and prevent the formation of agglomerates. The finer degree of particle dispersion reflects in a decreased rate of settling, a slight reduction in viscosity which permits the use of less water for a given viscosity and more effective use of the pigment in producing finishes or compositions of better uniformity, intensity, and hiding power.

Tamol R may be used in conjunction with other surface active materials. The best results are obtained under extended wet grinding in ball or pebble milling. One to four per cent of Tamol R based on the dry weight of the dispersed phase, is adequate for maintaining dispersions. The dispersing agent is effective in media over the pH range of four to 11. Rohm & Haas Co., Washington St., Philadelphia 5, Pa.

Manufacturing Chemists Meet

THE seventy-second annual meeting of the Manufacturing Chemists' Association was held June 1 at the Waldorf-Astoria Hotel, New York, N. Y. President Harry L. Derby, also president of American Cyanamid & Chemical Corp., New York, said that in the period between 1939 and 1944 more than $1,200,000,000 was spent on the chemical war program. One third of the total was provided by private capital. Chemical output increased 233% over that of 1939 and a further increase is possible if required, he stated. Mr. Derby was reelected president, and Lammot du Pont, chairman of E. I. du Pont de Nemours & Co., Wilmington, Del., was again named chairman of the executive committee, and Charles Belknap, president of Monsanto Chemical Co., St. Louis, Mo., was renamed a vice president. All other officers of the association were also reelected.

Nevillac OA

NEVILLE OA, a pale amber liquid resin with a sweet odor, has been introduced by the Neville Co., Pittsburgh, Pa., for use in adhesives, paper coatings, printing inks, paints and varnishes, raincoats, and for other applications. It is claimed to have a color retention superior to Neville 10 (PHO), a lower specific gravity (0.98 to 1.00), and less viscosity (W, Gardner-Holdt @ 25°C.) than the latter compound. Nevillac OA is soluble in all organic liquids except water and glycols. It is said to be compatible with most synthetic resins, GR-S and Hycar synthetic rubbers, and partly compatible with polyvinyl acetate and chloride copolymer.

UNITED STATES

General Industry Situation Improving; Estimates of Future Optimistic

In spite of the continuing problems of manpower and material shortages in some fields, the general situation in the rubber industry as a whole might be considered as showing real and definite improvement. Early in June the Rubber Director, in commenting on the June allocations of tires for passenger cars, trucks, and farm and large implement vehicles, stated that his instructions to the OPA to release 1,600,000 passenger car tires for the month of June was in accordance with plans made in February, 1944, to release during the hot summer months some of the tires which had been held in reserve during the colder winter period, but he emphasized at the same time that it would not be possible to manufacture enough of these tires to provide replacements for the non-essential or careless driver during the present year. Allocation of heavy-duty truck tires was not increased, and farm tractor and large implement tire allocations were decreased because of military demands for these types of tires.

Paul V. McNutt, Chairman of the War Manpower Commission, in a statement made at about the same time said that unless means were found to recruit additional manpower for the manufacture of heavy-duty tires, tire cord and fabric, the Armed Forces, particularly the Army, would suffer. Mr. McNutt revealed that a WMC survey showed an immediate need of 2,000 men—700 of them exceptionally strong men, as tire builders and mill men, calender operators, and in other occupations. To meet production requirements by September 30, heavy-duty tire makers will require a total of 5,000 men and 1,000 women; while the tire industry as a whole will require approximately 10,000 additional workers. Critical labor shortages were also said to exist in 28 tire cord and tire fabric plants where 4,000 additional workers will be required. It was also stated that serious labor shortages exist in plants making rubber soles and heels used by the Armed Forces and civilians to the extent of about 3,100 workers.

Leaders View Future with Optimism

R. P. Dinsmore, vice president of the Goodyear Tire & Rubber Co., in an address before the National Association of Purchasing Agents in New York and Rubber Director Bradley Dewey in a talk at the University of Akron early in June both reviewed the present and possible future position of the rubber industry and concluded that short of unexpected catastrophes, the major crises should almost all be eliminated within the next three to six months and that the world demand for rubber and rubber products in the postwar would be such that the rubber industry would continue to grow at a rapid rate. Dr. Dinsmore in his talk, which is reported in detail elsewhere in this issue, said that the future of the rubber industry appears as bright as any that can be mentioned and far above the average and that it is quite probable that the new synthetic industry, which has matured so rapidly under the stress of war, will prove almost as great a stimulus to the industry's future progress as did the advent of the popular-priced automobile.

"Even under adverse social conditions, this industry should progress better than many another less flexible or less firmly rooted in the economic needs of the world," he added.

Colonel Dewey in estimating the cost of Buna S rubber after the war at not much above 13¢ a pound declared that this shows it requires only the simplest "grass root" reasoning to show us that the rubber industry is free to develop new products without fear of having to discard them, as it was forced to do in the past, because of runaway rubber prices. Thus the new synthetic rubber industry brings to Akron and to the University, and he might have added to the whole rubber industry and the country, an opportunity which they must appreciate and grasp. We all look forward to the day when industry will be released from government control and when competition will once again drive the imagination of men and make for greater and greater progress, he said and went on to emphasize that synthetic rubber is going to mean not a year or two, but decades of opportunity for men to make better synthetics. Failure to realize the opportunities for research, development, and cooperative effort opened up by synthetic rubber could bring disaster to Akron, but with the weight of Akron's full faith behind it, synthetic rubber will need no subsidies, tariffs, or government pampering, Colonel Dewey concluded.

ODT Warns of Truck and Bus Tire Shortage

Colonel J. Monroe Johnson, Director of the Office of Defense Transportation, warned the nation's truck and bus operators on June 10 that there will be a shortage of heavy- and medium-duty truck and bus tires for replacement purposes during July, August, and September. Third quarter tire allocations by the ORD are substantially below the requirements for 10-ply-and-over tires in sizes 7.00 by 20 and up. The ORD total allotment to the ODT, as the claimant agency for tires for all forms of domestic transportation, is 795,945 heavy- and medium-duty truck and bus tires for the third quarter, about 18% over the second-quarter figure. The number of tires for original equipment on new vehicles in this third quarter is 160,058, about 65% more than the 97,156 tires required for this purpose in the second quarter, thus leaving 635,887 tires remaining for replacement purposes in the third quarter, as compared with a total of 577,735 replacement tires in the second quarter. The net effect is that the number of tires available for replacement purposes during the third quarter will exceed the second-quarter total by only 10%, while the normal seasonal increase in replacement demands between the second and third quarters is at least 25%, it was stated. Monthly replacement requirements for sizes 8.25 and up during the third quarter are 25,000 tires above the monthly production allotment and in the face of these shortages it is imperative that truck and bus operators practice the most rigorous conservation measures if a severe curtailment of essential motor transport services is to be avoided, Colonel Johnson warned.

Alcohol Situation Eases

Production of 190-proof alcohol in the first four months of 1944 was at a record rate of 192,200,000 gallons, against 137,400,000 gallons during the first four months of 1943, the WPB Chemicals Bureau announced June 10. The total 1944 alcohol supply is now estimated at 612,400,000 gallons, compared with an estimated requirement of 633,900,000 gallons, while preliminary estimates of supply and requirements for 1945 indicate that requirements would be 634,000,000 gallons, against an estimated supply of 639,800,000 gallons. Revised estimates left synthetic rubber requirements at 365,000,000 gallons for 1944 and 1945, and members of the WPB's Industrial Alcohol Producers Industry Advisory Committee told government officials that they felt the minimum safe stockpile figure, estimated earlier at 100,000,000 gallons, could be revised downward. The present stockpile was given as 86,100,000 gallons. This last action probably partially, at least, accounts for the announcement made June 20 by Donald M. Nelson that a holiday for the beverage distillers from industrial alcohol production was now possible during August, 1944. The reason for the holiday from industrial alcohol production was given by Mr. Nelson as the reduction in 1944 requirements of industrial alcohol for synthetic rubber by about 20,000,000 gallons and for 1945 by about 30,000,000 gallons, according to a letter to the WPB chairman from Rubber Director Dewey.

Guayule Project to Be Continued

Following the action of the Senate Agricultural Appropriations Subcommittee during May in recommending the continuation of the U. S. Emergency Project of guayule rubber, the matter was argued at some length by the conferees from the Senate and the House. Colonel Dewey in a letter dated June 17 to Congressmen concerned with this guayule project repeated recent testimony he had given before various committees of Congress.

"I do not take any position on guavule as a commercial postwar crop, but, as Rubber Director, I believe I would be derelict in my duty if I were to allow to pass without protest a decision that at this time would liquidate any supplies of crude rubber, whether growing in American fields, or in warehouses, or as a result of operations in the jungles of South and Central America. . . . In the meantime, we will be draining down our stockpile which is also too low today. We are down today to less than 115,000 tons of crude. We will be down to 55,000 tons by the end of the year. So there is no question about the fact that we need crude rubber."

CALENDAR

July 22-23.	Los Angeles Rubber Group, Inc. Summer Outing.
July 22	Chicago Rubber Group. Golf Tournament. Lincolnshire Country Club.
Sept. 10-15.	A. C. S. Fall Meeting. Hotel Pennsylvania, New York, N. Y.
Sept. 13-15.	Division of Rubber Chemistry, A. C. S. Fall Meeting. Hotel Commodore, New York, N. Y.
Oct. 3.	Los Angeles Rubber Group, Inc. Mayfair Hotel, Los Angeles, Calif.
Oct. 3-5.	National Safety Congress and Exposition, Chicago, Ill.
Oct. 5-7.	SAE National Aeronautic Meeting, Los Angeles, Calif.
Nov. 13-16.	American Petroleum Institute, Annual Meeting, Stevens Hotel, Chicago, Ill.

On June 20, the House, by a roll call vote of 299 to 43 voted to extend the guayule project by passing Amendment No. 41 to the Agricultural Departments Appropriation Bill. This amendment appropriates $5,420,000 for the fiscal year 1945 from an unexpended balance previously appropriated. This action will permit the continued cultivation of 32,000 acres of guayule in California and 1,000 acres in Texas, Arizona, and New Mexico and also permits construction of a $500,000 guayule processing mill near Bakersfield, Calif.

Biddle Attacks Synthetic Rubber Patent Pool

In testimony before the Senate Committee during June, Attorney General Biddle stated that the Department of Justice was watching the synthetic rubber patent pool first set up in December, 1941, by five companies and the Rubber Reserve Company and broadened last year so that now 20 corporations are cross-licensing each other, in order that special developments controlled by each are available to all during the war period. It was implied that participants in the pool may be subject to prosecution under the anti-trust laws after the war. This threat of postwar prosecution emphasizes the difference between his view of the patent system and that of the business community according to an editorial in the *New York Journal of Commerce*, which went on to say that regardless of the view that will ultimately prevail as to the scope of the property rights conferred by patents, it is unfortunate that so constructive an arrangement as the synthetic rubber pool is made the subject of threats of prosecution.

State Department Advisory Panel on Rubber

It was announced during June that the United States Department of State had completed the formulation of a combined industry-government rubber advisory panel which will serve as a consulting body on all matters concerning rubber and rubber substitutes, presumably from the international angle. A spokesman for the State Department said that the panel was at present concerned with outlining the sort of study needed for the discussion of economic problems of the supply and demand for rubber in the postwar period. Among the matters to be considered was the effect on the United States rubber industry of the possible development of a considerable volume of manufacturing of rubber products near the source of supply of natural rubber, by virtue of the construction of factories for this purpose in the Far East. It was stated that present plans called for assigning different subjects for study to various members of the panel.

Members of the panel are reported to be: F. B. Davis, Jr., United States Rubber Co.; Stuart Hotchkiss, Cambridge Rubber Co.; L. R. Jackson, Firestone Tire & Rubber Co.; P. and W. Litchfield, Goodyear Tire & Rubber Co.; Harry E. Smith, Manhattan Rubber Mfg. Division, Raybestos-Manhattan, Inc.; A. L. Viles, Rubber Manufacturers' Association, Inc.; John L. Collyer, B. F. Goodrich Co.; J. W. Bicknell, Rubber Development Corp.; William L. Batt, War Production Board; H. J. Klossner, Rubber Reserve Co.; L. D. Tompkins, Office of the Rubber Director; R. D. Young, Rubber Trade Association.

C. S. Snider, export manager of the American Hard Rubber Co., 11 Mercer St., New York, N. Y., on June 20 was elected president of the Export Managers Club of New York, Inc.

WPB Announcements

Two additional types of balata have been exempted from allocation control by Amendment 3 to Rubber Order R-1, as Amended January 12, 1944, effective May 29. Grades of raw balata affected are *Coquirana* and chicken-wire. Two other types, Massarunduba and Peruvian F. A. Q. white balata, were removed from restrictions in March, 1943. All types of scrap and reclaimed balata have always been exempted from restrictions. Freed from allocation, the specified grades may be used by manufacturers for any purpose. Such types as *Coquirana* and chick-wire are used in shoe and paper-splicing cements. The block types and Surinam sheet are used in such products as medicated adhesive plaster, industrial belting, and certain types of fuel cells.

New regulations governing various types of tires subject to allocation control, and new procedures for allocating such tires to vehicle manufacturers appear in a revised version of Appendix VI of R-1 and apply only to tires for special vehicles, as tractors and road-graders. The major change provides that cured-on solid tires are no longer subject to allocation, but may be procured by vehicle manufacturers through the regular certification-procedure provided in R-1 for tires not under allocation.

The procedures whereby authorized manufacturers may obtain tires have been revised to provide for the use of a new general application form (WPB-3663), which must be filled out by each manufacturer, stating his requirements and then forwarded to the appropriate industry division in WPB.

Another new form (GA-1773) has been specified for use of the industry division in authorizing the manufacturer to obtain necessary tires for the equipment he produces. Previously these steps were handled as unformalized statements from the manufacturers and, in turn, by letters of authority from the WPB. Provision is now made for the industry divisions to handle the issuance of authorizations for increases or decreases in a vehicle manufacturer's request for tires in order to allow the various industry divisions more flexibility in making adjustments in accordance with changes in vehicle production programs. Previously, the Office of the Rubber Director had handled such increases or decreases in response to direct appeals.

A certification form has been added to the order for the use of government agencies which purchase tires. This form, used by the claimant agencies when purchasing replacement tires, will enable claimants to formalize their procurement procedures to make proper charges against allotments.

Colonel Dewey on June 17 issued the following statement on neoprene:

"Production of neoprene is now fairly consistent at about 13,000 long tons per quarter.

"The overall requirements of the armed forces for special articles, such as life rafts, pontoons, "Mae West" life vests, pneumatic landing boats, combat wire, cable for military use, gas masks and essential items for which the special properties of neoprene are required, approximately balance production. However, the actual manufacturing of these products fluctuates from time to time and, as neoprene does not store well for any length of time, it may be possible to permit certain varying amounts of this specialty rubber to be used for other than these highly essential purposes. There is no assurance that this can be done regularly and of necessity the amounts permitted will vary.

"Recently, it was determined that, as a result of the conditions mentioned above, an excess amounting to less than 2% of planned production existed in neoprene. Therefore this small excess is being made available during the month of June for the manufacture of other items.

"Whether the same conditions will prevail in July has not been determined as yet. If the production of essential goods consumes all the neoprene available above minimum stockpile requirements, no neoprene will be allocated for other uses. However, should it be determined that July production of these goods is not at the moment consuming the entire amount available, the amount of neoprene to be allowed in other goods will be determined and consumption permitted."

Limitation Orders L-257 and L-257-a, as amended June 6, reestablish therein controls over the manufacture of farm machinery and equipment requiring rubber tires. Previously such control had been under R-1, which by Amendment 4, effective June 6, deletes such control. Production of farm machinery and equipment requiring rubber tires is restricted to: wheel-type tractors, including garden type; combines; pick-up hay balers and field hay harvesters; corn pickers; power sprayers (over ten gallons per minute); any item requiring tires to be mounted on wheel rims of the following sizes (diameter): 15-, 16-, 18- 20-, and 21-inch. Order L-257 governs the manufacture of all farm machinery, equipment, and repair parts to be used in the United States; L-257-a regulates the production for export of all such machinery and equipment.

Restrictions on the manufacture of tire-changing tools, anti-freeze testers, and battery fillers and hydrometers imposed by Limitation Order L-270 were removed May 27 owing to the increasing need of rebuilding and reconditioning automotive vehicles, farm tractors, and engines. Tire-changing tools were taken from L-270 because they are not under the jurisdiction of the Rubber Director; while the other devices were eliminated because they had been improperly classified as automotive maintenance equipment, are made of non-critical materials, and the total labor and production involved is said to be insignificant. On many other items in the order the limitation on production has been raised. Included are: brake lining grinders, appliers, and machines; air chucks and pressure gages, compression gages, tire pumps, air gage testers, and valve service tools.

Last month acetylene black, isopropyl alcohol, and acetic acid, acetic anhydride, and acetaldehyde were added to General Allocation Order M-300. At the same time Orders M-168—Isopropyl Alcohol—and M-243—Acetic Acid, Acetic Anhydride, and Acetaldehyde—were revoked.

Allocation Order M-34 has been revoked, and toluene made subject to General Allocation Order M-300.

United States Treasury Department, Washington, D. C., in a notice of May 31 exempts from the taxes imposed under section 3400 of the Internal Revenue Code, as amended (26 U.S.C. 3400), relating to tires and inner tubes, when such tires and tubes are sold under appropriate tax-exemption certificates to any person for use as component parts in the manufacture of an article to be sold direct to the War or Navy departments at a price excluding the tax on the tires and tubes. Unless ended sooner, this authorization expires at the close of the last day of the sixth full calendar month following the date of termination of present hostilities.

Footwear and Tire Schedules Revised by OPA

Ceilings on sales to shoe factories of black-type composition rubber soling slabs and molded soles were increased approximately 10% under Amendment 5 to MPR 477—Sales of Rubber Heels and Soles in the Shoe Factory and Home Replacement Trades—effective June 7, in order to help assure production of vitally needed rubber soles. Present ceilings are the same as December, 1941, prices. At that time prices were "frozen" by voluntary agreement. Manufacturers usually sell these materials to shoe factories, and wholesalers or any other sellers to shoe factories will take the same ceilings. The increase cannot be passed on to the consumer in the form of higher prices for shoes without special permission from OPA.

Investigation has shown that approximately 75% of manufacturers have been selling below total costs, and that the increase is necessary if manufacturers are not only to continue present production but to increase production substantially to meet 1944 and 1945 production objectives. The Office of Rubber Director has asked this industry to double its 1943 output of molded soles and soling slabs in 1944, and to more than double the 1943 production in 1945. The OPA action will facilitate the reaching of these objectives. Before the war black molded soles and soling slabs constituted less than 10% of the industry's production. However only black rubber soles have been produced since early in the war for they require less rubber, labor and factory time. The new ceilings range from 78¢ to $2.37 per slab for the composition soling slabs, and from 10¢ to 24½¢ a pair for full soles.

Amendment 6 permits manufacturers to take the prices of their nearest competitors as ceilings for new products only when the competitors actually sold or offered the same type of heel or sole in the base period. This specific requirement heretofore was merely implied, but has now been written expressly into the section dealing with this method of establishing the maximum price. Ordinarily manufacturers use either dollar-and-cents ceilings listed in MPR 477 or take their base period highest prices. The base period is either March, 1942, or October 1, 1941, to February 28, 1942. When they cannot use these two methods, they take the prices of their nearest competitors. Before a competitor's price can be taken, the competitor must have sold the same type of heel or sole in either of these two base periods and be establishing his ceiling on that basis.

This amendment will prevent the use of a competitor's price which has been established pursuant to a special application to OPA on the basis of special conditions and circumstances.

Amendment 13 to MPR 200—Rubber Heels, Rubber Heels Attached, and Attaching of Rubber Heels—on June 3 added to the list of corded heels Tuftex Cord made by the New Jersey Rubber Co.

Ration certificates for the purchase of men's rubber boots and rubber work shoes will be good indefinitely, according to Amendment 11 to RO 6A—Men's Rubber Boots and Rubber Work Shoes—effective June 12. Removal of certificate expiration dates both for consumer and trade use is in line with continuing action to simplify ration regulations. Formerly consumers had to use rubber footwear certificates within 30 days of issue, and dealers within one year. The one-year limit has not proved adequate because many dealers now carry only minimum stocks and do not reorder frequently from suppliers, especially since rubber footwear sales are highly seasonal. Consequently dealers often have had on hand expired certificates which had to be sent to OPA district offices for cancellation and replacement. Amendment 11 validates any such certificates that have expired, but have not yet been cancelled. Since expiration dates have been eliminated, rubber footwear manufacturers will no longer have to endorse certificates with the date of receipt. OPA is also specifically providing that a certificate is invalid and cannot be replaced if a dealer sells against it rubber footwear of a type different from the type called for on the certificate. Dealers are to send invalid certificates to OPA district offices for cancellation and will receive receipts for them. The receipts are to be attached to the dealer's inventory form.

Tire Industry Developments

Amendment 1, effective June 26, to RMPR 119—Original Equipment Tires and Tubes—was issued to set forth more accurately the freight practices customarily followed in the industry. Although section 2 (a) of the regulation specified that the ceilings for sales to base list accounts were delivered prices, it appears that sellers paid, under industry practice, the freight only on shipments of 100 pounds or more. Accordingly, section 2 (a) was amended to require sellers who charge the maximum prices to make a freight allowance on shipments of 100 pounds or more.

At the same time two other minor changes were made to make the regulation consistent with past industry practices. These changes relate to maximum prices for original equipment industrial cured-on tires, industrial pressed-on solid tires, and highway solid and cushion tires. Industrial cured-on solid tires are molded or vulcanized directly on to steel wheels, which weigh considerably more than the tires and are ordinarily supplied by the customer, so when the tire manufacturer makes a shipment of cured-on industrial solid tires, a substantial part of the weight of the shipment is represented by the steel wheels owned by the purchaser. Consequently it has not been customary for tire manufacturers to pay all the freight on shipments of these particular tires to the Far West. Accordingly, RMPR 119 has been amended to require a seller of cured-on industrial solid tires to make a freight allowance of at least 88¢ per 100 pounds when making shipments to any point in any of 11 far western states. However if these tires are shipped to a point in any of these states from a plant in one of these states, the seller must give the full freight allowance required on sales of other tires.

A similar problem existed with relation to industrial pressed-on solid tires and highway solid and cushion tires, all of which are equipped with steel inner bands. To compensate for the additional weight on shipments to the Far West the industry used prices for such sales 10% higher than the prices for sales to other parts of the country, and Amendment 1 permits sellers to continue this practice. But if the tires come from a plant in the Far West, the 10% differential may not be used.

At present a seller of original equipment tires or tubes under a government contract or subcontract who believes that a ceiling established by the regulation impedes or threatens production may file an application for adjustment in accordance with the provisions of Procedural Regulation No. 6. It appears that in some instances a manufacturer is directed by the WPB to produce original equipment tires or tubes not the subject of a government contract or subcontract, yet essential to the war program. Accordingly the adjustment section is amended to allow such a manufacturer to file an application for adjustment in the same manner and on the same form as required for application under Procedural Regulation No. 6. The same prerequisites to the granting of relief and the same criteria as to the amount of relief will be followed in connection with these cases as are followed with other cases filed under Procedural Regulation No. 6, except that the manufacturer shall refer to the direction of the WPB instead of a government contract or subcontract.

This amendment also sets forth the correct prices for a 11.00-20, 14-ply special tread mud and snow tire and a 6.50-10 tire, erroneously listed when the revised regulation was issued.

Three changes in MPR 415—Certain Federal Government Purchases of New Rubber Tires and Tubes—are made as follows in Amendment 6, effective May 29, in the United States and July 10, for Hawaii. 1. Ceilings for sizes and types of natural rubber tires and tubes not specifically provided with dollar-and-cent ceilings in the regulation will be established in line with the ceilings for listed sizes and types upon specific application to OPA. Ceilings proposed by the seller in the application will be considered approved unless OPA disapproves them within 20 days. 2. Sales to the Army and Navy of any new rubber tires and tubes except those for aircraft are brought under MPR 415 for the first time. Ceilings will be the same as those applying to sales in Foreign Economic Administration and the Maritime Commission. These ceilings are 5% less than the list dollar-and-cent ceilings, but are f.o.b. instead of delivered prices. 3. A specific provision is inserted so that a seller who believes that a maximum price established by this regulation impedes or threatens production may file an application for adjustment of his ceiling price.

When new rubber tires and tubes are sold to any government agency in special packing for overseas shipments, prices charged may be adjusted upward in accordance with any additions for special packing that may be granted later by OPA, according to Order No. 1 under MPR 415, effective June 12. Until any such additions are allowed, no seller may collect payment of more than the existing maximum prices for the tires and tubes. This change has been made to avoid any stoppage in these specially packed shipments pending consideration of a request from the industry for an addition to the maximum prices to cover extra costs involved in the special packing. The order shall be automatically revoked on the effective date of Amendment 7 to 415.

Amendment 4 (June 6), MPR 435—New Bicycle Tires and Tubes—sets ceilings for Super Roadmaster and Super Value tires brands owned by the Columbus Cycle & Sporting Goods Co. and of the Cornell Clipper brand of tires and tubes owned by the Pep Boys (Philadelphia).

Order 4 to MPR 528—Tires and Tubes, Recapping and Repairing—effective May 27, establishes retail ceiling for 3.85 by 20, 4-ply, synthetic rubber motorcycle tires and 3.85 by 20 synthetic rubber motorcycle tubes.

Amendment 77 to RO 1A—Tires, Tubes, Recapping and Camelback—provides that from June 1 through July 15 manufacturers may ship new passenger-car tires and tubes to dealers without obtaining tire rationing certificate replenishment portions. This move in no way changes the method whereby a motorist obtains a tire or tube certificate from his local War Price and Rationing Board, but will facilitate shipment of new

passenger tires from manufacturers to dealers and thus effect better distribution and service to the consumer. Under the new provisions manufacturers shipping new passenger tires during the period without obtaining replenishment portions must send a shipping memorandum to the dealer showing date of shipment, name and address of the dealer, and number of tires shipped. This memorandum shall also state that a copy of it has been sent to the OPA Inventory Branch in New York, N. Y., and that replenishment portions have not been transferred to the manufacturer. Once each week manufacturers must mail copies of the shipping memorandum to the OPA Inventory Branch. This mailing shall also include a summary showing the number of shipping memoranda being forwarded, the total number of new passenger tires and tubes covered, and a certification that the shipping memoranda cover all shipments made during the preceding calendar week.

Several other changes in tire rationing, solely affecting the trade, were announced by OPA:

1. All tire certificate replenishment portions (Parts B) dated before April 1, 1944, are to be invalid after July 15, 1944, unless they have been received by the tire manufacturer on or before July 15. When a Part B is held by a dealer for a considerable length of time, it is reasonable to assume, OPA said, that his stock of tires is sufficient for his present needs.

2. Tire dealers who closed their establishments several years ago because of limited tire distribution may now reenter business and obtain new passenger tires and tubes on a basis similar to the allotment provided for existing dealers. A person who was not a tire dealer on May 31, 1944, however, must obtain recognition as a dealer from his District Office before receiving an allotment of new passenger tires and tubes from a manufacturer under this amendment.

3. Provisions for the transfer of replenishment portions of tire rationing certificates between dealers without an accompanying transfer of tires or tubes are revoked. Prohibiting the transfer of these replenishment portions between dealers will eliminate the practice of some persons of selling their surplus replenishment portions on a speculative basis.

4. The distinction between retail and wholesale tire dealers is abolished because so few dealers are exclusively wholesalers. Elimination of the distinction between the two groups will permit the flow of new passenger tires among all dealers, upon OPA District Office authorization, without the surrender of replenishment portions. Previously a wholesale dealer could not transfer tires "downstream" to retail dealers, without obtaining these replenishment portions.

Amendment 7 (June 1) to RO 1B—Mileage Rationing: Tire Regulations for Puerto Rico—covers changes on eligibility and recapping.

Amendment 9 (May 31) to RO 1E—Mileage Rationing: Tire Regulations for the Territory of Hawaii—covers transfers of tires and tubes on vehicles.

Although the number of new passenger tires available for rationing in June was slightly larger than in May, demand still far exceeds production or the available quota, OPA revealed May 31. Fewer heavy-duty truck tires were rationed in June.

Quotas for tubes have been discontinued. Tubes will continue to be rationed, but without restriction as to the number of certificates that may be issued to eligible applicants. The supply of tubes is held sufficient to meet all reasonable demands.

Of the 1,600,000 new passenger and motorcycle tire quota authorized by ORD to OPA for distribution last month 1,409,342 were allocated to local boards and district offices. The balance, 190,658 tires, was held in reserve for later assignment to district offices as need develops. The national reserve, OPA pointed out, is substantially smaller than in the past; consequently district offices can expect less assistance than formerly from the reserve supply. Although the June total was 200,000 larger than the May total of 1,400,000 new passenger tires (an original allocation of 1,300,000 plus another 100,000 allocated later in the month), OPA pointed out that potential demand is still far ahead of the number of tires available for rationing. About 60% of the nation's 24 million automobile owners—all of the "B" and "C" drivers—may now apply for new tires. However, the current supply is not large enough to give tires at once to all who apply.

Type of Tire	Quota	Reserves	Total Allocation for June	Total Allocation for May
PASSENGER AND MOTORCYCLE:				
Grade 1 (new tires)	1,409,342	190,658	1,600,000	1,400,000
TRUCK AND BUS:				
7.50 or smaller	315,331	44,669	360,000	324,918
8.25 or larger	121,306	3,694	125,000	129,700
FARM TRACTOR AND IMPLEMENT:				
Rear tractor and large implement tires	15,640	4,360	20,000	25,000
Front tractor and small implement tires	41,400	13,600	55,000	52,000

The ORD has announced that 22 million synthetic rubber passenger-car tires are scheduled for production this year, of which 15 million will be manufactured during the last half. This total will be plus or minus 10%, depending upon the trend of military requirements. However, OPA has explained, the 22 million represents an average of less than one tire for each of the automobiles now on the road. Motorists have been on a "starvation diet" for the past two years in regard to new tires, with the result that the present demand has been built up to huge proportions. During normal times 22 million tires would be only about two-fifths of the number the industry would produce for replacement and original equipment.

Commenting on the lower allocation for June of the large over-the-road truck and bus tires, Charles F. Phillips, Deputy Administrator for Rationing, said:

"We realize that as the weather becomes warmer the demand for this type of tire becomes greater. In spite of this urgent need, however, it is impossible to increase quotas. The quota for June, in fact, is smaller by 5,000 than the May total.

"For two months we have been rationing more large truck tires than have been produced for civilian replacement. We may have to continue this procedure for the rest of the summer, since larger releases for civilian consumption are not anticipated. Early quota exhaustion and some idle trucks are inevitable. Some operators who get ration certificates may have a hard time finding tires. We may be entering our most critical period for this type of tire. The strictest sort of conservation is imperative.

"The critical situation with respect to the heavier truck and bus tires results from the fact that production cannot keep pace with military and civilian demand. Tires of this sort cannot be manufactured successfully from synthetics unless rayon cord is used, and the supply of rayon, in relation to demand, is insufficient.

"For the moment, therefore, most over-the-road truck and bus tires can be made only from crude rubber. It seems certain that production this year will fall short of demand."

The problem can be dealt with in one way only, OPA stated: strict conservation and more recaps.

A much easier situation exists with respect to the smaller truck tires, since more satisfactory production from synthetics has been developed, and the larger quotas for June means that all reasonable demand can be met, OPA said.

Rear tractor tires, which compete with airplane tires in production schedules, are in diminishing supply. The reduction in quota means difficult problems will arise. No solution for this problem is in sight until production increases, according to OPA.

June quotas of front tractor and implement tires are up slightly. As in the case of the smaller truck and bus tires, the situation here is easier than in the rear tractor category.

Above is a tabulation of June quotas and reserves by types of tires.

Other OPA Advices

Applications for adjustment in ceiling prices may be filed by essential manufacturers of a variety of rubber commodities who can meet specified conditions, under Amendment 15 to MPR 220—Certain Rubber Commodities—effective June 15. No adjustments will be granted, however, that increase the cost of living. Applications can be made only on products contributing to the effective prosecution of the war, and by an essential manufacturer, one whose product cannot be reasonably expected to be replaced at prices lower than the proposed ceiling. Any manufacturer who has entered into or proposes to enter into a war contract is deemed an essential producer of these rubber commodities, which embrace a wide range of items, including rubber wearing apparel, such as raincoats; stationery items, as erasers and bands; cements and adhesives made wholly or partly of rubber; latex products, etc.

Manufacturers may file adjustment applications where they believe the specified conditions would exist if the National War Labor Board should grant a pending application for wage increases.

OPA said it may make an adjustment in the ceiling price where it finds that the existing ceiling is such that taking into account the costs, earnings, and nature of the business, production is impeded or threatened and that the adjustment will not cause an increase in the cost of living.

An adjustment may be granted where the manufacturer agrees to cut the selling price of another commodity, or commodities, which will equal or exceed the total dollar amount of the adjustment requested.

Manufacturers may contract or agree on higher than existing ceiling prices for deliveries made during the pendency of an application for adjustment, but no payment higher than prevailing ceilings may be received until the application is finally disposed of, and then the price received must not be higher than the new ceiling set by OPA.

Amendment 9 to RPS 82—Wire, Cable, and Cable Accessories—effective May 29, adds three types of cable, inadvertently omitted from the original listing, to the list of manufacturers' dollars-and-cents ceilings: armored leaded cable—stranded—four-con-

ductor; bare armored ground wire—solid and stranded.

Amendment 3 to Appendix A of MPR 406—Synthetic Resins and Plastic Materials and Substitute Rubber—effective June 26, makes certain changes in the report form set out in the appendix in accordance with the terms of the regulation.

Amendment 1 to MPR 523—Plastics Products—effective June 27, emphasizes that the regulation does not apply to commodities made of natural rubber and balata or to plastics products assembled with other materials and sold as another commodity by a regular manufacturer of the latter products; it also makes other specific exemptions and clarifies the intended coverage of MPR 523. Specific exemptions include combined fabrics, cements, adhesives, laminated sheets, rods, and tubes prior to fabrication, phonograph records, screen cloth, wearing apparel and sheetings, electrical wire and cable. These products have been exempted because they are not customarily produced by plastics molders or fabricators; all are covered by other regulations. Also exempted are plastics pipe, tubing, pipe fittings, and tube fittings manufactured from copolymer vinyl and vinylidene chlorides, commercially known as "Saran B 11." These products were covered by dollars-and-cents prices before the effective date of the plastics regulation, and it was not intended that its issuance should change these prices, OPA said.

Several amendments have been added to MPR 395 covering ceilings on certain commodities imported into the Virgin Islands. No. 22, effective June 26, treats of women's and girls' wear and accessories such as belts, dress shields, garters, rainwear, beach wear, brassieres, foundation garments; while Amendment 23, effective July 3, deals with men's and boys' wear, including outwear garments, underwear, armbands, athletic supporters, belts, garters, hosiery, and suspenders. No. 25, effective July 17, relates to imported domestics, household sundries, and miscellaneous dry goods, whether or not made principally of fiber, paper, synthetics, rubber or composition, including bath mats, shower curtains, seat cushions, pads, mats, and covers, umbrellas. Imported shoes, including beach wear, rubbers, and galoshes, are the subject of Amendment 26, effective July 24.

Revised Order 124 (June 9) under MPR 136 as Amended—Machines and Parts, and Machine Services—covers maximum prices for sales of sclerescopes and durometers and parts for these two instruments by the Shore Instrument & Mfg. Co., Jamaica, N. Y., and by sellers other than the Shore company.

Order 229 to MPR 136, effective June 19, sets forth ceiling prices at which the Chrysler Corp., Detroit, Mich., and its factory distributers may sell to resellers Dodge motor trucks equipped with natural rubber and/or synthetic rubber tires.

RMPR 264, effective May 30, established ceilings which United States buyers may pay for vegetable waxes and beeswax bought for importation, including carnauba and ouricury waxes, candelilla wax, and beeswaxes. The prices established are the same as those stipulated on WPB import licenses as maximum buying prices for licensed U. S. importers. The purpose of the revised regulation is to protect United States users of these waxes against an advance in prices in countries of origin, and subsequent pressure on established ceilings for finished products in which the waxes are used.

MPR 540, effective July 10, placed all used passenger cars under price control.

The resignation, effective June 20, of William L. Sims, II, as price executive of the Chemicals and Drugs Branch was announced June 6. Lester Chandler, price executive of the Rubber Branch, will assume the added responsibilities of Acting Price Executive of the Chemicals and Drugs Branch.

A. L. Pickard

Chairman of Los Angeles Group

Almon Leroy Pickard, currently chairman of the Los Angeles Rubber Group, Inc., has for the past 17 years been one of the most enthusiastic and lively participants in its activities. He was first chosen vice-chairman in December, 1942. With like energy he has served the Braun Corp., Los Angeles, Calif., since 1924, when he joined the firm as industrial representative; he is today technical adviser, assisting in the planning, selection, installation, and use of scientific laboratory equipment and process control instruments.

Mr. Pickard was born April 26, 1903, in Tilton, N. H., and attended the Morse High School, Bath, Me., and Tufts College, Medford, Mass., in the Class of 1923. He attained the Bachelor of Science degree in economics.

Five other institutions enjoy his membership. They are the Delta Tau Delta Fraternity, the American Institute of Mining & Metallurgical Engineers, the American Petroleum Institute, the California Natural Gasoline Association, and the Southern California Meter Association. Golf, swimming, and bridge occupy the greater part of his recreational hours.

War Food Administration, Washington, D. C., on May 31 announced that although additional rubber tire production facilities for large-size tires are now coming into use, tractors operating on steel wheels will have to remain on steel a while longer, for all additional facilities are needed for tires for military vehicles to be used by the fighting forces and for trucks used in domestic transportation. For an unpredictable length of time, while available facilities must be used mainly for such production, large tractor tires are expected to be available only in sufficient quantities to meet the bare needs for equipping new tractors and for replacing worn-out or damaged tires on tractors already operating on rubber.

Office of War Information, Washington, D. C., in its report of June 5 emphasized the urgent need of increasing collections of fats from the nation's homes. Industrial uses of fats and oils in 1944 will be so heavy that despite the currently improved glycerine situation, housewives must turn in at least 230 million pounds of used kitchen fats; collections last year were a little under 100 million pounds, 5% of the total amount of industrial, or hard, fats needed for the 1943 war program. The amount sought this year will be a little more than 10% of the required hard fats. The higher grades of fats collected are used for soap making; while others are split to produce glycerine and fatty acids, from which come stearic and oleic acids, vital components of war materials, including synthetic rubber. Oleic acid is also used to soften reclaimed rubber and in the fabrication of nylon. The rubber industry will require 91 million pounds of hard fats this year, or 4.52% of the total.

Rubber Products Company, Ltd., is the firm name under which David Calvin, Charles H. Churchill, and B. E. Dougherty are conducting business at 539 Clarence St., Los Angeles, Calif.

National Headquarters of Selective Service, Washington, D. C., on June 12, upon recommendation of the Inter-Agency Committee on industrial deferments, instructed state directors of Selective Service to add three activities to the list in which key registrants in the 18-25-year-old group may be considered for occupational deferment. Included among the three are tire builders; claimant agency; Office of the Rubber Director.

Western States Rubber Co. is erecting a new storage building, 54 by 92 feet, at its plant at 825 E. 60th St., Los Angeles, Calif., to cost $3,500.

Belting & Rubber Co. has received a building permit for a new processing room at its plant at 2316 E. 38th St., Los Angeles, Calif., at a cost of $3,000.

Leo T. Crowley, Foreign Economic Administrator, Washington, D. C., and other officials of the FEA on June 1 held their first meeting with the 18 members of the new FEA Export Advisory Committee organized to confer with the FEA on broad problems of foreign trade currently encountered by the export trade and FEA. Among the committee personnel are N. S. W. Vanderhoef, vice president, Turner Halsey Export Co., New York, N. Y.; and John L. Gillis, vice president, Monsanto Export Co., St. Louis, Mo.

The Rubber Manufacturers Association, Inc., 444 Madison Ave., New York, N. Y., is distributing bi-weekly six news releases, with illustrative two-column mats, covering ways to prolong tire life. The next few months will be the most critical ones for tires since the war began unless there is an unexpected and radical reduction in military requirements. Technical journals have deplored the over-optimistic press statements concerning the near availability of unlimited civilian tires, and war agencies and the rubber industry are stressing present conservation needs.

Brown-Muth Rubber Co. is the firm name under which William F. Brown and Robert L. Muth have published a certificate that they are conducting business at 5511 S. Bandera St., Los Angeles, Calif.

EASTERN AND SOUTHERN

Continental's New Furnace Black Plant Now in Operation

At Sunray, Tex., is the new Continental furnace black plant which, under special priority authorization by the WPB, Continental Carbon Co., 295 Madison Ave., New York 17, N. Y., erected and put into operation in double-quick time. This plant is now in full production turning out Continex furnace blacks that are helping to fill an important quota in the vast need of medium loading low-heat generating blacks of this type.

Many months of careful laboratory development, pilot-plant operation, and analysis went into establishing the standards of high-quality control that guide today's production of the new Continex furnace blacks. As construction progressed, operations kept pace, and a single unit of the plant was soon started which enabled Continental to carry on its developments under actual production conditions. Typical batches of the single unit production then were tested in different formulations to verify the properties best suited to the special requirements of synthetic rubber processing as to elongation, tensile strength, hardness, heat build-up, plasticity, etc.

So that users of furnace blacks might be fully informed on the utilization of the Continex blacks in GR-S processing, development technicians and plant engineers worked closely together to document the research and testing results. These data covered all the characteristics and applications of the new Continental blacks, with complete technical information relative to the formulation requirements.

As a result, and in cooperation with the research laboratories of the Witco Chemical Co., sole distributer of Continental furnace blacks and channel blacks, a series of special technical bulletins on the Continex furnace blacks is being issued. Since initial production will be concentrated on turning out Continex SRF, a furnace black of the semi-reenforcing type, the first of these bulletins is devoted entirely to demonstrating the properties and applications of this one type, which imparts low hysteresis to any rubber compound with greatly increased modulus and fair tensile.

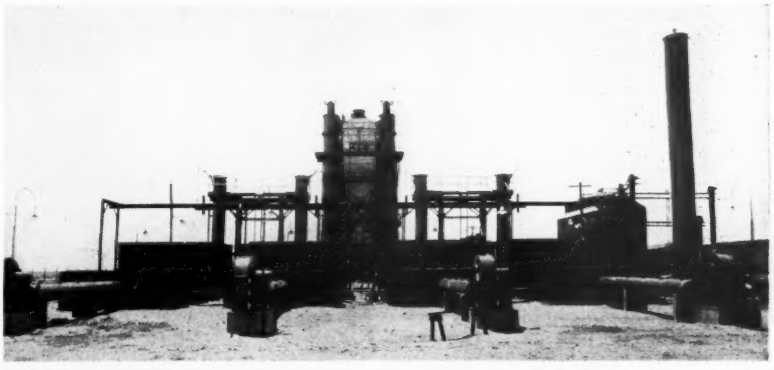
Because of the flexibility of the type of furnace used in the new Continental plant, plans call for eventual production of reenforcing furnace black in addition to the semi-reenforcing Continex furnace black, now in production.

As the new furnace black plant of Continental Carbon Co. is adjacent to the 160-acre channel black plant which Continental erected at a cost of more than $1,000,000 six years ago and which is one of the largest of its kind in the world, Continental will be able to ship mixed carloads of furnace and channel types of blacks for customers who find it advantageous to order their carbon black shipments in this way. Further details may be obtained on Continental carbon blacks through Continental's sole distributer, Witco Chemical Co., which maintains offices in New York, N. Y., Chicago, Ill., Cleveland, O., Boston, Mass., Detroit, Mich., and Akron, O.

War Department, Washington, D. C., last month announced that as a result of the accelerated salvage program being conducted by the Army Service Forces, savings totaling $20,772,000 were effected during the first quarter of 1944 through the sale of scrap and refuse material collected by the Army in the United States. Included in the March figures were 1,309 net tons of rubber scrap sold for $49,000.

Elmhurst Rubber Co., Inc., manufacturer of molded sponge and solid rubber products now devoted solely to war orders, 79-48 Albion St., Elmhurst, L. I., N. Y., according to President George E. Jeandheur has opened a new one-story office building adjacent to its factory to take care of the employes necessary for the increase in business. The company is also now working on postwar problems and endeavoring to line up the civilian business enjoyed before the war. Mr. Jeandheur believes prospects are excellent in this field.

Duralene Processed Fabrics, Inc., 116 Imlay St., Brooklyn 31, N. Y., recently appointed W. E. Leistner chief chemist. He had been with the Vulcan Proofing Co., Brooklyn, for 12 years as research chemist and more recently as chief chemist of its postwar research laboratory.



Panorama View of Continental Carbon's New Furnace Black Plant, Showing the Battery of Furnaces in the Foreground with the Precipitators in Center Background

Among Officials at the Opening of Continental Carbon's Furnace Black Plant Were *(Left to Right)*: W. H. Ferguson, Executive Vice President, Continental Oil Co., Denver, Colo.; Julius Tumpeer, Vice President, Witco Chemical Co., Chicago, Ill.; Judge W. S. Schwartz, Superior Court of Cook Co., Chicago; George D. Olds, Continental Oil, New York, N. Y.; R. I. Wishnick, Witco Chemical Co., New York; J. H. Dunn, Vice President, Shamrock Oil & Gas Corp., Amarillo, Tex.

A View of One of the Processing Drums in the New Furnace Black Plant of Continental Carbon Co. at Sunray, Tex.

U.S. Rubber Expanding

To meet rising war production demands, United States Rubber Co., 1230 Sixth Ave., New York 20, N. Y., has established new manufacturing facilities in seven cities, according to an announcement June 26 by president Herbert E. Smith. Besides, the company is expanding present plant facilities at four of the 38 plants it now operates. The new manufacturing operations include production of rayon cord at Scottsville, Va.; Signal Corps wire at Lowell, Mass.; Army raincoats at Ligonier, Ind.; special military equipment at Worcester, Mass.; special invasion equipment at Manchester, N. H., and Grand Rapids, Mich.; asbestos and footwear parts at Beacon Falls, Conn. A new plant at Hogansville, Ga., built last year, is being doubled in size to permit expanded production of lightweight Asbeston yarn for fire-fighting suits and other vital war items. Tire plants are being expanded at Chicopee Falls, Mass., and Los Angeles, Calif. The company's tire plant at Eau Claire, Wis., is being reconverted from the production of small arms ammunition and greatly enlarged.

A. N. Guy has been made manager of the automobile tire department of the Fisk division, according to J. C. Ray, Fisk sales manager. A native of Grand Rapids, Mich., and educated there, Mr. Guy joined the rubber company in 1929 as chief clerk of the Grand Rapids branch, then went into the field service and engineering department in 1930 with headquarters at Detroit and Kansas City. Subsequently he was appointed assistant to the district manager of tire sales in Kansas City. In 1934 he was transferred to Dallas, Tex. as assistant to the district manager, and in 1935 entered the batteries and accessories department at New York, becoming manager in 1939. Shortly before Pearl Harbor, Mr. Guy went to Detroit to handle tank track sales to Army Ordnance, returning to New York in 1942 to concentrate on Fisk tire sales.

Mr. Ray has been elected president of the New York Sales Managers' Club, succeeding William F. Arnold. Mr. Ray was vice president and chairman of the program committee for the season just ended and previously had served as a member of the board of governors.

GR-S Chain Modifier

OEI, designated as the "One Essential Ingredient" in the manufacture of GR-S, is a chain modifier, extracted from a natural oil, which controls the lengths of the chains formed by the polymerization of styrene and butadiene. Too much of this chemical added to the mixture keeps the molecules too small and produces a soupy substance of no practical value; too little allows the molecules to become too large and to create cross-linkings of molecules instead of chains, thereby making the mixture too stiff. Proper control of the modifier produces molecular chains of desired lengths. This consistency of production assures a standardized GR-S and permits the manufacture of articles from GR-S that will meet stringent usage tests. OEI was developed and in production by U. S. Rubber before Pearl Harbor. This modifier was the one found most suitable for the rubber program at its instigation. Others have been developed, but OEI is still used in a large proportion of the GR-S production.

Rubberset Co., brush manufacturer, Newark, N. J., has appointed Elwood M. Jones, assistant sales manager in charge of all paint brush sales, according to President G. L. Herrick. Mr. Jones, a native of Los Angeles and a graduate from the University of Southern California, was associated with the sales department of American Air Lines on the West Coast before becoming a sales representative for Rubberset in California in the Summer of 1937.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., recently announced that construction is going forward on additions to the neoprene plant at Louisville, Ky., which will increase its rated annual capacity 50%. This work is expected to be completed by the end of 1944. The government-owned plant, built and operated by du Pont, has been producing in excess of its rated capacity of 40,000 tons of synthetic rubber a year.

Vansul & Co., Englewood, N. J., manufacturer of rubber colors, pigments, and fillers, recently exhibited at the Englewood Citizens National Bank & Trust Co. an educational display showing the practical application of color to natural and synthetic rubber products. The exhibit, through the courtesy of John De C. Van Etten, president of Vansul, visualized from raw materials to finished articles the manufacturing skill requisite to colored rubber products.

Glyco Products Co., Inc., manufacturer of industrial chemicals, 26 Court St., Brooklyn 2, N. Y., has announced appointment of Maurice S. Green, formerly of the National City Bank of New York, as Glyco comptroller. In his new position he will be in charge of the finances of the company and will assist the management generally in the development of the business.

Water Soluble Coumarone Emulsion

Nevilloid C-55, a water soluble, coumarone-indene resin emulsion, offered by The Neville Co., Pittsburgh, Pa., exhibits a continuous and cohesive film and will withstand considerable flexing. It can be incorporated with latices of natural rubber, GR-S, or Hycar OR without prior dilution or without causing coagulation of the rubber by the addition of a 10% aqueous sodium hydroxide solution only, in an amount sufficient to give a pH of 10. A typical mix by volume contains 20 parts Nevilloid C-55, 20 parts latex, and two parts 10% aqueous sodium hydroxide. Without the use of sodium hydroxide to reach a pH of 10 it is possible to incorporate Nevilloid with latices only if the solids content of each emulsion is reduced to 10% by weight by dilution with water. Mixing undiluated latex and Nevilloid causes coagulation of the rubber.

Nevilloid C-55 may be used with alkyd and melamine resin emulsions, and emulsions of paraffin wax, carnauba wax, and Hydrowax. In general it is miscible with all oil-in-water types of emulsions and yields uniform films with emulsions of materials ordinarily compatible with coumarone-indene resins. Resin emulsions of lower melting point than Nevilloid C-55 can be produced where safer and more plastic compositions are required. Dry pigments may be ground directly into Nevilloid. The coumarone emulsion has a specific gravity of 1.044 to 1.049 at 15.6/15.6° C., a pH of 6.5 to 7.5, an isoelectric point of about 2.9, and contains 65% solids by weight. Its film on glass is semi-gloss, free from grains, slightly tacky, and slightly translucent from 50% aqueous solution.

OHIO

General Tire & Rubber Co., Akron, has appointed Theodore Lyman general manager of the government-owned synthetic rubber plant operated by General at Baytown, Tex. Mr. Lyman replaces Harvey J. Elwell, who is returning to his post as president of General Latex & Chemical Corp., Cambridge, Mass., but who retains his membership on the management committee, and with Fred Mayfield, of the executive staff of General Tire, will make periodic visits to the Baytown plant. Mr. Lyman has been with General for 12 years. Starting as field accountant, he became office manager of the Dallas branch and later was transferrred to the Mississippi Ordnance plant as plant accountant. When the synthetic tire division was set up at Baytown, he went there as plant accountant, was promoted to chief accountant, and later was made superintendent of services, from which post he steps up to the general managership.

Chester A. Brown has been promoted from production superintendent to assistant general manager. Robert A. Van Patten-Steiger has been named production superintendent, and Jack Furbee succeeds him as general foreman. Mr. Brown was production superintendent for General Latex before going to Baytown. J. P. Keith, formerly with Humble Oil Co., was named maintenance engineer, and J. H. Faull, Jr., remains as technical superintendent.

J. E. Powers, manager of General's New York branch, has assumed special sales duties in the company's tire department at Akron. David Coan, Buffalo territory salesman, replaces him in New York.

Dayton Rubber Mfg. Co., Dayton, last month, through I. Eisbrouch, vice president and manager of the tire division, announced the appointment of L. J. Waldron as assistant sales manager of the division. Mr. Waldron was with the Pennsylvania Rubber Co., Jeannette, Pa., for 27 years, having first entered the industry with The B. F. Goodrich Co., Akron, in 1912. Upon the outbreak of the war he became associated with the Office of Rubber Director, Washington, D. C., as a consultant and stayed ten months. In October, 1942, he joined the Dayton organization as government representative, in charge of the Washington offices. Mr. Waldron assumed his new duties at once, with headquarters at the home offices of the company.

The B. F. Goodrich Co., Akron, has been issued a building permit for construction of an addition to the Goodrich factory at 5400 E. Olympic Blvd., Los Angeles, Calif., to cost $4,000.

W. R. Hucks, with the operating division of the Rubber Reserve Co. since 1942, has been named production manager of all government synthetic rubber plants for Goodrich. He had been manager of the raw materials division of the company before accepting the government assignment. Mr. Hucks entered the rubber industry in 1926 as a compounder in the Goodrich tire division and went to the company's California plant in 1928 as chief chemist, later becoming technical manager.

Ohio Rubber Co., Willoughby, O., has leased a one story, 140- by 250-foot building at Conneautville, Pa., for the production of special war products with plant operation to begin in July. The plant will be under the general direction of R. A. Mertz, vice president in charge of manufacturing.

C. B. Pooler

Pooler Carey Vice President

The Philip Carey Mfg. Co., Cincinnati, has named C. B. Pooler vice president in charge of manufacturing. The Carey company operates nine plants in the United States and Canada. Born in Fort Dodge, Iowa, Mr. Pooler has spent practically all his life in the building material industry. An electrical and mechanical engineer, he has served as production manager, plant manager, division operations manager, and manager of labor relations in plants producing fabricated steel, metal lath, insulating board, roofing, paints, paper, asbestos and gypsum products.

Lincoln Plant Inspected

Several scores of Goodyear Tire & Rubber Co. representatives and leading townspeople in Lincoln, Nebr., recently toured the company's new plant there to watch production of bullet-seal fuel cells for military aircraft. Formerly used as a U. S. Army Air Corps supply depot, the Lincoln plant was remodeled extensively when it was taken over by Goodyear for fuel cells. A large amount of new equipment was also installed.

Following the plant tour, the Goodyear representatives were hosts to the key Lincoln townspeople at a dinner in the Cornhusker Hotel. The principal speaker was R. S. Wilson, Goodyear vice president in charge of sales, who recited Goodyear's history and dwelt on synthetic rubber production and its manufacture into wartime products.

Other Goodyear officials attending from Akron were Clifton Slusser, vice president; Z. C. Oseland, treasurer; C. P. Joslyn, manager, synthetic rubber sales division; T. A. Knowles; H. J. Carroll, general traffic manager; L. E. Judd, director of public relations; W. S. Wolfe, factory superintendent; J. E. Stafford, superintendent, mechanical goods; A. Jae Sears, manager, north central division; Herb Wilson, public relations; and H. E. Blythe, vice president, Goodyear Aircraft Corp.

A feature of the plant tour was fuel-cell exhibits in local banks and at the Cornhusker Hotel.

Goodyear personnel shifted to Lincoln to direct bullet-seal fuel cell production there includes W. H. Rudder, general superintendent; Frank R. Vernotzy, personnel manager; A. T. Imes, works accountant; R. W. Young, manager of materials and merchandise control; J. E. Etnire, manager, labor department; A. L. Mull, plant engineer; E. C. Humphreys, development; N. Showers, inspection foreman; W. C. Becket and T. Reese, general foremen; E. Kratzer, N. Browning, M. Carter, W. P. Sumpter, A. C. Gibbs, and W. Dumphy, shift foremen; E. Queen, technical service; D. Miller, compounder; G. Brewer, G. McKean, C. E. Sharlow, and C. M. Wright, supervisors. The plant will employ about 1,200 persons, most of them women.

Goodyear Appointments

A. G. Cameron, vice president and general manager of The Goodyear Tire & Rubber Export Co., has announced the appointment of Howard C. Steiner as managing director of The Goodyear Tyre & Rubber Co. (Australia), Ltd., Granville, N. S. W., succeeding W. G. Kither, who resigned because of ill health. Mr. Steiner joined the parent company in 1915 and later served in the Armed Forces during the first World War. Then he returned to Goodyear, joining the export company in 1919 as a special sales representative assigned to the Far East. In 1926 he was made special representative for Japan, but in 1930, Mr. Steiner was transferred as sales director to Australia. In 1937 he was appointed assistant managing director.

Although Mr. Kither has retired from active duty, he will continue a member of the board and vice chairman. Mr. Kither joined Goodyear-Australia at the Adelaide, South Australia branch in 1916 and was named manager of the Australian company in 1921. In 1926, Mr. Kither became managing director of the newly organized Goodyear Australia company and played an important role in the establishment of the company's manufacturing facilities in 1927.

Goodyear-Australia manufactures car, truck, tractor, and airplane tires and a complete line of mechanical goods. Since America's entry into the war, this plant now produces bullet-proof seal tanks for both the American and Australian Air Forces.

Willis H. Edmund, employe activities director of Goodyear Aircraft, has been named to direct employe educational and recreational activities of all Akron Goodyear plants.

Appointment of R. D. Vickers in charge of plastics and chemical sales in the eastern region of the United States, with headquarters at 600 W. 58th St., New York, N. Y., was announced recently by Goodyear. He is a member of the new plastics and chemical sales division. A native of Logansport, Ind., and graduate of Purdue University, Mr. Vickers started with Goodyear in July, 1929, in staff training and was transferred several months later to mechanical goods compounding. In December, 1932, he was shifted to tire compounding, then to the research department in May, 1933.

J. A. Lewin last month became manager of Goodyear's dealer division. Joining the company in 1928, Mr. Lewin served in the Hartford district as inside general line and truck tire salesman. In 1937 he was assigned to Akron on the sales squadron and placed in charge of training sales personnel; then early in 1938 he was named assistant manager of the Buffalo retail stores. He returned to Akron as a member of the LifeGuard Division, becoming its manager in 1939. He resigned in September, 1941.

William L. Rodgers has joined the mechanical goods department to handle V-belt sales in the Chicago territory. He comes to Goodyear from the Dayton Rubber Mfg. Co., for whom he was agricultural representative on V-belt sales among large manufacturers of agricultural machinery. Prior to that he had been with the Ohmer Register Co.

Other Company Notes

Years ago Goodyear established a training program for young men with good educational background and ambition to get ahead. The first small group was tutored only in factory production, but the idea proved so successful it was expanded later to include engineering, research, sales, operating, and store management. More recently it extended into a new field—agriculture—at the 17,000-acre Goodyear Farms, Litchfield Park, Ariz., where 21 young men are not only learning to be expert farmers, but also acquiring 80 acres of land which some day will be theirs, as provided by the company's plan of farm purchase and ownership.

The 1,500,000th 6.00x16 synthetic rubber tire was recently removed from the curing mold at Goodyear's Plant 2.

Paul E. Gleichauf, manager of the export company's merchandising department, recently celebrated his thirtieth anniversary with Goodyear.

Pharis Tire & Rubber Co., Newark, O., has leased a large factory at Parkersburg, W. Va., for the expanded production of fuel cells and pneumatic lifting bags, now made at the Newark plant. Furber Marshall, president, has named M. R. Bell, chief aeronautical engineer of the company, manager of the Parkersburg plant. In Mr. Bell's absence from Newark, R. D. Parr, technical superintendent of the fuel cell and lifting bags department, becomes production superintendent of the Newark division.

View of Bullet Seal Fuel-Cell Building Department at Goodyear's Lincoln Plant

NEW ENGLAND

R. I. Rubber Club Outing

The annual outing of the Rhode Island Rubber Club was held June 16 at the Wannamoisett Country Club, East Providence, R. I. Golf in the afternoon was followed by dinner and a general get-together in the evening. The entire program was one of fun and pleasure, and to this end the usual serious after-dinner talks were omitted.

Twenty-five members enjoyed playing the excellent Wannamoisett course. The prize winners were: first low gross, A. B. Lloyd; second low gross, W. Newman; low net (ties), S. Tingley, W. Stafford, L. Yates, H. W. Greenup; second low net, G. Wilson; most pars, E. Galligan; most fives, F. S. Bartlett; most sevens, G. R. Hill; biggest number one hole, H. A. Stawniak; high gross, W. K. Priestly; blind bogey, H. Bainbridge.

Somewhat over eighty members and guests were present at dinner, and most of them carried home door prizes in the form of War Stamps and War Bonds. The various prizes awarded were made possible by the generous contributions of the following concerns:

R. T. Vanderbilt Co., E. I. du Pont de Nemours & Co., Inc., L. G. Whittemore, Inc., Wilbur Chemical Co., New Jersey Zinc Sales Co., Pequanoc Rubber Co., Ernest Jacoby & Co., Binney & Smith Co., Godfrey L. Cabot, Inc., Monsanto Chemical Co., Titanium Pigment Corp., Imperial Paper & Color Corp., American Cyanamid & Chemical Corp., Wm. D. Eggelston Co., Henry L. Scott Co., Cleveland Liner & Mfg. Co., Solar Compounds Corp., Standard Chemical Co., Wilmington Chemical Co., Carbro Chemical Co., General Atlas Carbon, Bunatak Chemical Co., Taylor Instrument Co.

Boston Woven Hose & Rubber Co., Boston 3, Mass., has made John H. Rowe, for the past several years Chicago manager, vice president in charge of western sales, covering the territory from Chicago to the Pacific Coast. As of August 1, Stuart A. Guild will become manager of the Chicago office; he has been in charge of the Connecticut, Rhode Island, and Western Massachusetts territory.

CANADA

Alan H. Williamson, Canadian Rubber Controller, while in Toronto, Ont., recently to confer with the Rubber Association of Canada, stated there will be no new automobile tires for civilians in 1945 unless they are engaged in essential war work and qualify under the tire rationing order, despite the fact that tires for essential civilian use will be produced in greater number this year than in either of the past two years. The Rubber Controller estimated that about 750,000 passenger-car owners in Canada would thus be unable to obtain new tires this year. But those who cannot get new tires may have their old ones retreaded, since retreading restrictions have been removed. Mr. Williamson also said that the needs of the armed forces are being met adequately by the rubber industry. He added that the only major problem is to complete conversion from crude to synthetic rubber.

Canadian Manufacturers' Association held its annual meeting last month in Toronto, Ont. J. G. Godsoe, chairman of the Wartime Industries Control Board, Ottawa, Ont., revealed that Canada's supplies of crude rubber, along with synthetic rubber output, are expected to be sufficient to provide for military equipment and highly essential civilian items. But, he stated, there is no immediate prospect of tires becoming generally available. Mr. Godsoe, also controls coordinator for the Munitions Department, said that stockpiles of crude rubber built up before the war spread to the Pacific have been exhausted, and Canada now is dependent on "trickles" from Ceylon, Mexico, Latin America, and Africa. The speaker added that conversion to the use of synthetic from crude rubber is proceeding remarkably well, although there have been and still are technical difficulties. He noted that the Polymer Corp. plant at Sarnia, Ont., is exceeding its rated capacity, and production of the synthetic has reached a point where some quantities have been released for export, and restrictions have been removed on the use of GR-S (Buna S) other than latex. He warned, however, that this action does not mean there will be enough tires for all Canadian car drivers, adding that limited plant facilities, labor shortages, and a scarcity of rayon and cotton tire cord were among other limiting factors.

C. D. Howe, the Canadian Munitions Minister, also addressed the Association. He mentioned that the creation of a number of secondary industries based on synthetic rubber is among peacetime possibilities stemming from war developments. He referred to the government-owned Polymer plant as a gold mine as a source of raw material for a wide variety of products. He believes that this plant should become the center for a number of important secondary industries.

R. W. Richards, general sales manager, Goodyear Tire & Rubber Co. of Canada, Ltd., was elected president of the Aeronautical Institute of Canada at the second annual Dominion conference held recently in Toronto, Ont.

A National Research Council report tabled in the House of Commons at Ottawa, Ont., May 29 by James MacKinnon, Canadian Trade Minister, said that simple methods had been devised for removing rubber from Russian dandelion roots and from the leaves and pods of milkweeds.

Polymer Corp., Sarnia, Ont., was inspected May 24 by 13 members of the Canadian House of Commons, members of a subcommittee of the War Expenditures Committee. They were received by R. C. Berkinshaw, president of Polymer Corp., and John R. Nicholson, general manager.

OBITUARY

Robert G. Loomis

ROBERT GEORGE LOOMIS, production superintendent of the Detroit, Mich., plant of the United States Rubber Co., died in Detroit, May 17, following a cerebral hemorrhage. He was born July 4, 1887, in Hartford, Conn., and attended the Stearns Preparatory School in that city.

In 1911, Mr. Loomis entered the Hartford Rubber Works and remained in the plant after its absorption by U. S. Rubber. He was transferred to Detroit in 1928. During the World War he had served in the Navy Air Corps.

The deceased was a member of the Elks, the Ancient Arabic Order of Nobles of the Mystic Shrine, various Masonic Lodges, and the Society of the Descendants of the Founders of Hartford.

Funeral services were held May 18 at the Hamilton Funeral Chapel, Detroit, and at the Marchant Funeral Home, Hartford, May 20. Burial was in Cedar Hill Cemetery, Hartford.

His father, three brothers, and three sisters survive.

Louis P. Gould

LOUIS P. GOULD, supervisor of synthetic rubber compounding at the Inland Mfg. Division, General Motors Corp., Dayton, O., died recently at a Dayton hospital following an operation. He was graduated in 1922 from the University of Kentucky and spent the following 18 years in the employ of the Miller Rubber Co., Akron, O., before joining Inland four years ago.

Mr. Gould, a registered professional engineer, was chairman of Sub-Committee XXII on Sponge Rubber of the American Society for Testing Materials Committee D-11 on Rubber Products and a member of the American Chemical Society of the Division of Rubber Chemistry, A. C. S., Pi Kappa Alpha, and the Akron Masonic Adoniram Lodge No. 517.

A wife, a daughter, one son, and a brother survive.

Arthur Dyer

ARTHUR DYER, 77, executive of the Laurel Co., Garfield, N. J., died June 14 at his home in Freehold, N. J., following a brief illness. For the past 50 years Mr. Dyer was a member of the New York Produce Exchange and served for four years on its governing board. He also had been president of the Passaic & Delaware Realty Co. and of Allwood Manor, Inc., a director of the Central National Bank of Freehold, and a member of the local board of education. A co-founder of the Laurel company in 1906, he served as its president until 1934, when he became vice president.

Funeral services were held at the Dyer residence June 17 with burial in Freehold.

He leaves a wife, a son, and three daughters.

Frederick W. Ehlers

FREDERICK WILLIAM EHLERS, secretary-treasurer of the Atlantic Rubber Mfg. Corp., New York, N. Y., died May 22 following a heart attack. He was born June 30, 1864, in Harburg, Germany, where he attended school, but lived in England and France before coming to the United States about 50 years ago. Mr. Ehlers was also president and treasurer of the American Clay Pipe Works, New York, N. Y., and a member of the Rubber Manufacturers Assomember of The Rubber Manufacturers Association, Inc., the American Dental Trade Association, and the Benevolent & Protective Order of Elks.

Funeral services were held at his home in Maplewood, N. J., May 25. Burial was in Fairview Cemetery, Fairview, N. J.

A wife, two daughters, and a son survive.

It's an old saying, but it's especially true in these days of all-out war production. And it's something to remember if your rubber technicians are ever baffled by a problem of compounding synthetic rubber.

Many hands make Light the work

FOR SYNTHETIC RUBBER is different from the natural rubber they have known, and when trouble comes, they may need special knowledge. That knowledge we can supply—our "hands", added to your own, can make light work of almost any difficulty. So, if we can be of help, call us—and call quickly. Our scientists developed Perbunan in the Esso Laboratories of the Standard Oil Development Company. We make Perbunan from raw material to finished rubber, and our scientists and field technicians will be glad to give you the help you need. Ask for it—whenever you need it!

PERBUNAN
REG. U. S. PAT. OFF.

THE SYNTHETIC RUBBER THAT RESISTS OIL, COLD, HEAT AND TIME

Write STANCO DISTRIBUTORS, INC.
26 Broadway, New York 4, N. Y.
Warehouse stocks in New Jersey Louisiana and California

Maurice P. Felton

MAURICE P. FELTON, vice president of Wellington Sears Co., Inc., 65 Worth St., New York 13, N. Y., died May 28 of heart disease in Philadelphia, Pa., where he was born in 1887. He was graduated from Northeast High School, the School of Pedagogy, and Temple University and also attended the Philadelphia Textile School. After teaching for seven years in Philadelphia schools he became associated with the textile industry and joined Wellington Sears in 1928.

Funeral services were held May 31 at the Stetler Funeral Home in Philadelphia.

A wife, a daughter, and two sons survive him.

Harry J. Kapler

HARRY JOHN KAPLER, associated for the past several years with Goodyear Rubber Sundries, Inc., New Haven, Conn., died May 26 in a New Haven hospital after a long illness. He was born August 23, 1887, in Cleveland, O., and was graduated from the Case School of Applied Science. Mr. Kapler was formerly connected with the sales division of the Mechanical Rubber Co., Cleveland, O., and later became vice president of the Aetna Rubber Co., Cleveland, and of the Vulcanized Rubber Co., Morrisville, Pa. He was also a member of the Masonic order.

Cremation took place at Springfield, Mass. He leaves a wife and two sons.

Lee E. Phillips

LEE ELDAS PHILLIPS, a co-founder of the Phillips Petroleum Co., Bartlesville, Okla., died there recently of a heart ailment following several years of ill health. He was born August 18, 1876, at Conroy, Iowa. In 1904 Mr. Phillips moved to Indian Territory and engaged in banking and oil operations, becoming vice president and treasurer of the firm he helped to found. He was a member of the Elks, Masons, Kiwanis, and other clubs and fraternal organizations.

Funeral services and burial were in Bartlesville.

A wife, a daughter, two sons, four grandsons, two sisters, and four brothers survive the deceased.

Amos A. Shifty

AMOS A. SHIFTY, comptroller of the Lake Shore Tire & Rubber Co., Des Moines, Iowa, died suddenly May 17 in Des Moines. He was born in Fairview, N. J., February 19, 1905, and attended Cliffside Park High School and New York University.

Funeral services were held May 22 in Grantwood, N. J.

Survivors include a wife and a daughter.

FINANCIAL

Anaconda Wire & Cable Co., New York, N. Y. First three months, 1944: net income, $325,291, or 77¢ a share, compared with $280,928, or 67¢ a share, in the 1943 period.

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
Baldwin Rubber Co.	Com.	$0.175	July 21	July 15
Boston Woven Hose & Rubber Co.	Pfd.	3.00 s.	June 15	June 1
Crown Cork & Seal Co., Inc.	Com.	0.25	July 17	June 23
Crown Cork & Seal Co., Inc.	Interl. A	0.25	July 1	June 20
Detroit Gasket & Mfg. Co.	Com.	0.25 q.	July 25	July 8
Dunlop Tire & Rubber Goods Co., Ltd.	Pfd.	2½%	June 30	June 15
Firestone Tire & Rubber Co.	Com.	0.375	July 20	July 5
Garlock Packing Co.	Com.	0.50	June 30	June 17
General Cable Corp.	Pfd.	1.75	Aug. 1	July 14
General Electric Co.	Com.	0.35 q.	July 25	June 23
General Tire & Rubber Co.	Pfd.	1.125 q.	June 30	June 20
Hercules Powder Co., Inc.	Com.	0.50	June 24	June 13
Jenkins Brothers	Pfd.	1.75 q.	June 29	June 16
Jenkins Brothers	Non v.	0.50	June 29	June 16
Jenkins Brothers	Com.	2.00	June 29	June 16
Lima Cord Sole & Heel Co.	Com.	0.10	June 30	June 19
Rome Cable Corp.	Com.	0.15 q.	June 30	June 11
Thermoid Co.	Pfd.	0.75 q.	June 15	June 7
Thermoid Co.	Com.	0.10	June 15	June 7
Whitney Blake Co.	Com.	0.15 s. resumed	June 30	June 20

Norwalk Tire & Rubber Co., Norwalk, Conn. Six months ended March 31, 1944: net income, $84,826, equal to 34¢ a common share, compared with $61,246, or 22¢ a common share, in the same period a year ago; net sales, $3,096,758, against $2,409,512.

S. S. White Dental Mfg. Co., Philadelphia, Pa., and subsidiaries. First quarter: net profit, $157,715, or 53¢ a share, against $183,709, or 62¢ a share, in the March quarter of 1943; net sales, $4,233,394, compared with $4,132,998 in the 1943 period.

Thermoid Co., Trenton, N. J., and certain subsidiaries. March quarter: net profit, $134,419, or 19¢ each on 600,000 common shares, against $242,475, or 46¢ a share, in the same period last year. Statement does not include results from operations of Joseph Stokes Rubber Co., Trenton, and Joseph Stokes Rubber Co., Ltd., Welland, Ont., Canada.

TRADE MARKS

United States

406,848. **Streekno.** Packings and gaskets. John R. Rauhut, doing business as Excel Heating & Air Conditioning Co., Chicago, Ill.

406,931. **Rio Resin.** Age resister. B. F. Goodrich Co., New York, N. Y.

407,011. **Aircat.** Tires. General Tire & Rubber Co., Akron, O.

407,078. Representation of a parrot at the end of the word: **"Cradle-tyme."** Crib sheets and mattress covers. A. F. Sauer Co., Milwaukee, Wis.

407,149. **Kleinert's Snap-In.** Dress shields. I. B. Kleinert Rubber Co., New York, N. Y.

407,160. **"Frankies."** Footwear. Frank Brothers Footwear, Inc., New York, N. Y.

407,162. Representation of shield containing the words: **"Sulfole"** and **"Mercaptans."** Accelerators. Phillips Petroleum Co., Bartlesville, Okla.

407,186. **Pin-Up Girl.** Brassieres, girdles, garter belts, etc. Gem-Dandy, Inc., Madison, N. C.

407,190. Representation of small circles surrounding the word: **"French Casino."** Footwear. The Fashion Bootery, Seattle, Wash.

407,231. **Activex.** Activator. J. M. Huber, Inc., New York, N. Y.

407,330. **The Monitor De Luxe.** Tires. Richmond Rubber Co., Inc., Richmond, Va.

407,337. **Partemp.** Insulation material. Firestone Tire & Rubber Co., Akron, O.

407,350. Representation of a black rectangle, the lower half containing rows of wavy white lines, the upper half the word: **"ReH."** Electrical insulating materials. Rohm & Haas Co., Philadelphia, Pa.

Rims Approved and Branded by The Tire & Rim Assn., Inc.

Rim Size	May
15" & 16" D.C. Passenger	1944
16x4.00E	108,611
16x4.50E	4,735
16x5.00F	4,243
15x5.50F	4,053
16x5.50F	6,220
17" & Over Passenger	
18x2.15B	1,839
Flat Base Truck	
20x4.33R (6")	43,562
15x5.00S (7")	185
18x5.00S (7")	22
20x5.00S (7")	258,155
24x5.00S (7")	1,541
20x6.00T (8")	32,167
22x6.00T (8")	1,181
24x6.00T (8")	1,112
18x7.33V (9/10")	489
20x7.33V (9/10")	37,337
22x7.33V (9/10")	9,549
24x7.33V (9/10")	9,473
Semi D. C. Truck	
15x5.50F	2,530
16x5.50F	16,482
Tractor & Implement	
15x3.00D	3,849
16x3.00D	986
19x3.00D	10,192
20x4.40E	1,173
22x4.50E	176
18x5.50F	2,948
20x5.50F	177
24x5.50R	5,634
24x6.00S	866
36x6.00S	2,478
40x6.00S	264
24x8.00T	2,795
28x8.00T	1,064
36x8.00T	1,891
42x8.00T	214
44x8.00T	78
W8-24	2,566
W8-32	381
W9-38	3,581
W10-24	819
W10-28	4,675
W10-38	2,590
W10-40	407
W11-24	2,319
W11-28	962
W11-36	583
DW9-38	1,238
DW10-38	1,637
DW11-24	4,182
DW11-28	2,731
DW11-36	2,122
DW11-38	4,103
DW12-26	610
DW12-30	3,755
Cast	
24x15.00	162
Total	617,694

April Native Sulphur Output Was 18% above March's and the highest since October, 1942, according to the U. S. Department of the Interior. Output was brought nearly into balance with sales, and producers' stocks were reduced only 6,917 tons.

EXTRA WEIGHT "*Pays the Freight*" FOR EXTRA QUALITY

SUN RUBBER PROCESSING OILS

Cuts Costs 15% to 20% . . . Reduces Cracking, Bleeding, Hardening

When a manufacturer improves the quality of his product without increasing costs he has made progress . . . but when he adds to quality and decreases costs it is a major achievement. That's exactly what a manufacturer of synthetic and reclaimed rubber products accomplished.

After long use of certain types of softeners and plasticizers, this manufacturer decided to test other processing oils, including Sun products. Because of the better results obtained with Sun Circo Light Processing Oil, as proved in these tests, he switched to Sun products exclusively. In over a year of use, here are some of the advantages:

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15% to 20% more processing oil can be used, increasing the weight of the products. This increased sales value almost pays for the oil used. Savings in processing costs have also been effected . . . so that the net results are far superior products at considerably lower cost.

The experience of Sun Engineers combined with the advantages of Sun Processing Oils have helped many rubber goods manufacturers to make similar improvements in quality and savings in cost.

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APPLICATION

United States

2,347,662. **Abrasive Sheet Material in Which Abrasive Particles are Bonded to a Backing by a Heat-Convertible Synthetic Resin.** R. P. Carlton and B. J. Oakes, assignors to Minnesota Mining & Mfg. Co., all of St. Paul, Minn.

2,347,697. **Composite Article Consisting of a Highly Compacted Mixture of Powdered Bagasse and Powdered Gilsonite; at least One Outer Surface Is of Pretormed Thermoplastic Sheeting Bonded to the Bagasse.** C. D. Levey, New Orleans, La.

2,347,775. **Stocking Top with Elastic Yarn.** L. H. C. Green and E. St. Pierre, both of Pawtucket, assignors to Hemphill Co., Central Falls, both in R. I.

2,347,798. **Driving Belt of Inextensible Cords Embedded in Rubber Composition.** V. G. Reiling, assignor to Dayton Rubber Mfg. Co., both of Dayton, O.

2,347,868. **Heel Lift of Resilient Rubber-Like Material to Which Is Attached a Plate of Sheet Metal Smaller Than the Attaching Face of the Lift, and a Layer of Particles of Fibrous Material Adhering to the Marginal Portions of the Attaching Face of the Lift and the Plate of Sheet Metal.** R. P. Allen, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,347,988. **Valve Construction with a Rubber Sealing Member.** O. J. Burke, New York, N. Y.

2,348,074. **Breathing Apparatus for Use under Water and in Noxious Gases.** C. J. Lambertsen, Philadelphia, Pa.

2,348,108. **High Altitude Aviation Mask.** A. H. Bulbulian, Rochester, Minn.

2,348,151. **Pumping Apparatus.** L. C. Rotter, Maplewood, and V. G. Klein, assignors to Lincoln Engineering Co., both of St. Louis, both in Mo.

2,348,220. **Adhesive Paper Having an Adhesive Film of a Water-Soluble Polyvinyl Alcohol.** B. L. Kline, Manhasset, assignor to Western Union Telegraph Co., New York, both in N. Y.

2,348,300. **Shoe with Plastic Insole.** C. C. Klaus, Highland, Ill.

2,348,335. **Jointed Rubber-Covered Die Mask.** J. M. Escher, assignor to J. H. Matthews & Co., both of Pittsburgh, Pa.

2,348,350. **Tire.** F. R. McKelvey, Cuyahoga Falls, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,348,536. **Electrical Conductor with an Adherent Continuous Coating of Synthetic Linear Crystalline Polyamide.** W. E. Gordon, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,348,583. **Welt Insole Having an Unchanneled Insole Blank and an Adhesively Secured Sewing Rib of Synthetic Plastic Material on a Textile Base.** W. C. Wright, Sanbornville, N. H.

2,348,674. **Shoe Bottom Filler of Comminuted Cork, Fibers, Rosin, and a Rubber Cement.** H. M. Dodge and R. J. Bush, both of Wabash, Ind., assignors to General Tire & Rubber Co., Akron, O.

2,348,740. **Diaphragm Consisting of a Fabric Coated with a Relatively Tough and Hard Layer of a Cured Thermosetting Resinous Substance, for Impermeability, and a Relatively Soft Uncured Mass of Plastic Material of the Same Composition as the Hard Layer Surrounding the Fibers of the Fabric, to Make the Diaphragm Relatively Soft and Flexible.** H. Y. Jennings, Clio, and J. A. Gillen, assignors to Opeman Laboratories Co., both of Flint, both in Mich.

2,348,752. **Air Space Cable in Which Use Is Made of Glass Fibers Bonded together with a Thermoplastic Dielectric Binder.** J. C. Guayle, Ashton, Chester, England, assignor to International Standard Electric Corp., New York, N. Y.

2,348,773. **Protective Sheath, Having Thin, Flexible, Elastic, and Resilient Walls, for Surgical and Medical Use.** E. T. Wyman, Brookline, Mass.

2,348,793. **Lifesaving Suit.** C. Dybberg, Bygdoy, Norway; vested in the Alien Property Custodian.

2,348,871. **In a Sheet Pulp Container Forming Machine, a Receiver Mold and a Rubber-Like Plunger for Nesting and Compressing a Blank.** L. M. Wiley, assignor of one-third to J. T. Lett and one-third to R. B. Wiley, all of Marion, Ind.

2,348,919. **Radio Shielded Spark Plug Connectors Having Plastic Bodies.** T. W. Milton, Detroit, Mich., assignor to Flex-O-Tube Co., a corporation of Del.

2,349,068. **In a Shoe Press, an Inflatable Sole Pressing Pad.** F. Dawson, West Roxbury, assignor to Compo Shoe Machinery Corp., Boston, both in Mass.

2,349,153. **In Producing Flocked Sheet Material, the Use of *Hevea* Rubber Cement and Plasticized Neoprene Cement.** J. Ferrante, Johnstown, N. Y., assignor to Kenlea Mfg. Corp., a corporation of N. Y.

2,349,216. **Footwear Having a Pointedly Tipped Elastic Tongue on the Heel.** C. O. Walper, Kitchener, Ont., Canada.

2,349,236. **Adhesive Bond for Simulated Pile Carpet.** V. H. Bodle, assignor to Mishawaka Rubber & Woolen Mfg. Co., both of Mishawaka, Ind.

2,349,392. **Elastic, Waterproof Section in Pad Holder.** J. Weber, New York, N. Y., assignor to Weber Foundations, Inc., a corporation of N. Y.

2,349,463. **An Air Valve Consisting of a Rigid Body Provided with a Passage a Portion of Which Is Tapered Inwardly to Form a Valve Seat and a Valving Member of Elastic Material, the Inner End of Which Is Shaped to Fit into the Valve Seat.** J. T. Riddell, Chicago, Ill.

2,349,568. **Pad of Rubber-Like Material between the Elements of a Pivotal Connection of the Body Frame Member and Radial Truck Frame Member of a Railway Vehicle.** J. C. Travila, Jr., Philadelphia, Pa., assignor to General Steel Castings Corp., Granite City, Ill.

2,349,587. **Liquefied Bitumen and Rubber Mixture in Manufacturing Lids for Hermetically Closing Containers.** H. Brand, Zollikon, Switzerland.

2,349,746. **Elastic Top of a Stocking.** F. E. Morris and H. Wagner, both of Philadelphia, Pa., assignors by mesne assignments to Scott & Williams, Inc., New York, N. Y.

2,349,762. **Resilient Rubber Cushioning Sleeve for a Handle Bar.** F. W. Schwinn, Chicago, Ill.

2,349,806. **Resiliently Flexible Body of Plasticized Vinyl Chloride Gel for a Pattern for Molding Plaster.** M. Bean, Yellow Springs, O.

2,349,866. **Thin Flexible Plastic Sheet Material as Cover for the Bottom of a Shoe Outsole.** V. M. Heck, assignor International Shoe Co., both of St. Louis, Mo.

2,349,894. **Atomizer.** W. A. Wells, Washington, D. C.

2,350,076. **For a Self-Laying Track-Type Vehicle, a Track Including a Band of Tension Elements Surrounded by a Body of Resilient Rubber-Like Material.** K. D. Smith and R. Mayne, both of Akron, O., assignors to B. F. Goodrich Co., New York, N. Y.

2,350,114. **Head Construction for a Doll with a Skin of Elastic Material on Its Body.** A. M. Katz, Brooklyn, assignor to Ideal Novelty & Toy Co., Long Island City, both in N. Y.

2,350,130. **Footplate for Skis, Snowshoes, Etc., Including Sheets of Rubber, a Rigid Sheet of Material beneath Them, and an Inflatable Tube between the Rubber Sheets.** J. H. Rinkinen, Atlantic Mine, Mich.

2,350,185. **Elastic Binding Tape for Shoe Uppers.** J. M. Pero, Randolph, and N. Daniels, Malden, Mass.

2,350,201. **Resilient Support for Vibrating Screens Consisting of Metal Leaf Springs Supporting the Screen Frame and Elements of Resilient Rubber Interposed between Springs and Frame.** H. L. Strube, Philadelphia, Pa., assignor to Link-Belt Co., Chicago, Ill.

2,350,312. **Can Closure Having a Coating of Normally Non-Viscous Thermoplastic Adhesive Material Which Becomes Viscous and Tacky, When Heated, and Provides a Sealing Bead.** A. G. Hatch, assignor to Fibre Can Machinery Corp., both of Rutland, Vt.

Dominion of Canada

419,849. **Portable Motor-Driven Power Hammer Including an Outer Casing, a Piston, Reciprocable Driving Elements, and a Flexible Rubber Loop-Like Link Extending through the Piston and Having Its Loop-Shaped Ends Engaged about Studs on the Driving Elements for Reciprocating the Piston.** Independent Pneumatic Tool Co., Chicago, assignee of F. P. Forse, Aurora, both in Ill., U. S. A.

419,858. **For Packaging Molten Food Materials, a Sheet Material Covered with a Superficially Adherent Flexible Film of Rubber, Paraffin Wax, and an Amorphous Wax Blended with the Paraffin.** Marathon Paper Mills, Co., Rothschild, assignee of A. Abrams and G. W. Forcey, both of Wausau, and C. L. Wagner, Menasha, all in Wis., U. S. A.

419,860. **Barrier in an Impregnated Power Cable, with Insulating Material Impregnated with Polymerized and Polymerizable Material.** Northern Electric Co., Ltd., Montreal, P. Q., assignee of T. R. Scott and J. K. Webb, both of London, England.

419,874. **Insulated Electric Cable with a Submerging Insulating Oily Olefinic Polymer of a Polyisoolefin and a Simple Isoolefin.** Standard Oil Development Co., Linden, assignee of L. A. Bannon, Roselle, both in N. J., U. S. A.

419,896. **Foundation Garment with Sections of Stretchable Material.** L. J. A. Amyot, Quebec, P. Q.

419,920. **Fluid-Tight Emergency Kit, Which Includes a Body Portion of Fluid-Tight Material, a Fluid-Tight Side Closure, Means for Inflating the Body Portion, and Means for Attaching the Kit to the Body of the Wearer.** H. G. Morner, New York, N. Y., U. S. A.

419,921. **Life Saving Suit.** H. G. Morner, New York, N. Y., U. S. A.

419,964. **Rubber Sealing Compound for a Container.** Dewey & Almy Chemical Co. of Canada, Ltd., Villa La Salle, P. Q., assignee of A. W. Bourque, Brookline, Mass., U. S. A.

419,967. **In a Windshield Wiper, Rubber Channel Lining and Rubber Strips for a Pair of Wiper Elements.** Firestone Tire & Rubber Co., assignee of R. W. Brown, both of Akron, O., U. S. A.

419,970. **In an Antenna Cone for a Moving Vehicle, a Hollow, Molded, Relatively Thin-Walled, Frusto-Conical Portion of Flexible Rubber-Like Material.** General Tire & Rubber Co., assignee of R. W. Brown, both of Akron, O., U. S. A.

420,061. **In a Friction Absorbing Device, Top and Bottom Followers, a Plurality of Friction Shoes Interlocked with the Followers, and a Resilient Unit under Compression between the Followers and Shoes, the Unit Has Internal and External Rigid Members between Which Are Vulcanized Resilient Rubber Pads.** American Steel Foundries, assignee of C. E. Tack, both of Chicago, Ill., U. S. A.

420,090. **Insole Reenforcing Material Which Includes a Strip of Duck Coated on One Side with Thermoplastic Stiffening Material and on the Same Side with a Coating of Rubber-Like Adhesive.** B. B. Chemical Co. of Canada, Ltd., Montreal, P. Q., assignee of S. M. Griswold, Newton, Mass., U. S. A.

420,100. **Track for Track-Laying Vehicles.** Dominion Rubber Co., Ltd., assignee of R. S. Garber, both of Montreal, P. Q.

420,106. **Resilient Mounting with a Body of Resilient Rubber-Like Material.** B. F. Goodrich Co., New York, N. Y., assignee of H. H. Fink, Akron, O., both in the U. S. A.

420,114. **Tire Fabric Assembly Including the Requisite Number of Suitably Dimensioned Bias Cut Strips for the Formation of a Tire Core.** Lee Rubber & Tire Corp., Conshohocken, assignee of J. C. Carlin, Norristown, both in Pa., U. S. A.

420,158. **In a Flexible Grinder, an Assembly Including a Threaded Spindle, a Disk Fixed thereon, and a Tapered Rubber Core Carried on the Spindle with Its Big End against the Disk.** J. C. Florack, Rochester, N. Y., U. S. A.

420,221 and 420,222. **Hosiery with an Elastic Top.** W. B. Davis & Son, Inc., assignee of R. E. Davis, both of Fort Payne, Ala., U. S. A.

420,250. **Hosiery Top Incorporating Elastic Thread.** Interwoven Stocking Co., New Brunswick, N. J., assignee of J. H. Miller and F. Evans, both of Martinsburg, W. Va., U. S. A.

420,251. **Rib Knit Top for Hosiery Incorporating Elastic Thread.** Interwoven Stocking Co., New Brunswick, N. J., assignee of P. L. Thurston, Martinsburg, W. Va., and L. B. Wilcox, Westfield, N. J., both in the U. S. A.

420,316. **Tired Wheel.** B. D. Maule, Michigan Centre, Mich., U. S. A.

420,327. **Tamper-Proof Closure Including a Rubber-Like Sealing Diaphragm.** Aluminum Co. of America, Pittsburgh, assignee of D. H. Tilson, Kensington, both in Pa., U. S. A.

420,351. **Protective Cover for Camera Shutters, Which Includes an Annular Rubber Member U-Shaped in Cross-Section to Cover the Shutter Rim.** Canadian Kodak Co., Ltd., Toronto, Ont., assignee of N. B. Green and W. A. Riddell, both of Rochester, N. Y., U. S. A.

420,369. **In a Shoe Press, Two Dilatable Diaphragms.** Compo Shoe Machinery Corp., Boston, assignee of F. Dawson, West Roxbury, both in Mass., U. S. A.

420,372. **V-Belt Having an Endless Rubber Body Reenforced with an Endless Metal Ring, and a Rubberized Wrapper around the Rubber Body and Integrally United Thereto.** Dayton Rubber Mfg. Co., Dayton, O., assignee of W. T. Wagner, Hollywood, Calif., both in the U. S. A.

420,374. **Resilient Metal and Rubber Bearing.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of L. Marick, Grosse Pointe Farms, Mich., U. S. A.

420,390. **Resilient Mounting Including Plates with Rubber between Them.** Lord Mfg. Co., assignee of R. C. Henshaw, both of Erie, Pa., U. S. A.

420,424. **Absorbent Belt for Use with Wallpaper Surfacing Fluid, the Marginal Portions of Which Are Treated with a Rubber-Like Water-resistant Material.** United Wall Paper Factories, Inc., assignee of J. W. Close and C. H. Hoot, all of Chicago, Ill., U. S. A.

United Kingdom

559,858. **Electrically Insulated Conductors in Which the Insulation Includes a High Molecular Weight Polymer.** E. I. du Pont de Nemours & Co., Inc.

560,047 and 560,048. **Shock Absorbers.** G. H. Dowty.

560,199. **Pneumatic Tires.** W. H. Lambert.

560,201. **Wheel Brake Systems for Aircraft.** Dunlop Rubber Co., Ltd., and H. W. Trevaskis.

560,270. **Flexible Tubes.** C. V. Morris.

560,401. **Comforters for Infants.** G. S. H. S. M. Seymour.

DOUBLE THINKING PAYS

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All projects upon which we cooperate are held in strictest confidence, as the Rubber Industry well knows because of its long acquaintance with Monsanto. May we work with you? MONSANTO CHEMICAL COMPANY, Rubber Service Dept., Second Natl. Bldg., Akron, Ohio. Telephone: HEmlock 6191.

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Accelerators	Plasticizers
Antioxidants	Insoluble Sulfur "60"
Colors	Sulfuric Acid
Wetting Agents	

MONSANTO CHEMICALS

PROCESS

United States

2,347,643. **Adhesive Tape.** G. Schieman, Bronx, N. Y., assignor to International Plastic Corp., Morristown, N. J.

2,348,287. **Forming Composite Articles Having Absorbent Material between Superimposed Sheets of Vulcanizable Rubber.** E. J. Fickers, assignor to Baldwin Rubber Co., both of Pontiac, Mich.

2,348,772. **Strong Flexible Articles from Vinylidene Chloride Polymers.** R. M. Wiley, assignor to Dow Chemical Co., both of Midland, Mich.

2,349,290. **Improving the Adhesion of Nylon to Rubber.** D. L. Loughborough, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,349,549. **Articles of Depolymerized Rubber.** H. V. Hardman, Belleville, and K. V. Hardman, Clifton, both in N. J.

2,349,613. **Porous Rubber-Coated Printing Plates.** R. G. Chollar, assignor to National Cash Register Co., both of Dayton, O.

2,349,709. **Adhesive Fabric.** H. A. Evans, assignor to Coreve Corp., both of Fairhaven, Mass.

2,349,710. **Elastically Contractible Adhesive Fabric.** H. A. Evans, assignor to Coreve Corp., both of Fairhaven, Mass.

2,349,877. **Reenforcing a Portion of a Shoe Upper by the Application of a Coat of Liquid, Vulcanizable Rubber Latex; Then Applying Heat and Pressure Directly to the Coating.** T. C. Morris, Medford, Mass., assignor to United Shoe Machinery Corp., Flemington, N. J.

2,350,032. **Delustering Cellulose Acetate Fabric.** O. B. Hager, Glenside, assignor to Rohm & Haas Co., Philadelphia, both in Pa.

Dominion of Canada

419,844. **Tire Treading.** B. F. Goodrich Co., New York, N. Y., assignee of T. E. Boyle, Akron, O., both in U. S. A.

419,993. **Platen Rolls for Writing and Imprinting Apparatus.** Standard Register Co., assignee of K. M. and W. C. Sherman and W. B. Turner, executors of the estate of J. O. Sherman, now deceased, and A. W. Metzner, all of Dayton, O., U. S. A.

420,113. **Building Tires.** Lee Rubber & Tire Corp., Conshohocken, assignee of J. C. Carlin, Norristown, both in Pa., U. S. A.

420,148. **Method of Making Sheet Material Including the Application of Resin Coatings.** W. C. Toland, trustee, conventor with and assignee of E. Bassist, both of Brookline, Mass., U. S. A.

420,260. **Coating a Surface with Solid Particles to Be Adhesively United to This Surface.** Minnesota Mining & Mfg. Co., St. Paul, Minn., assignee of J. S. Smyser, now deceased, in his lifetime of Quincy, Mass., both in the U. S. A.

United Kingdom

559,917. **Rubber Adhesives.** United States Rubber Co.

559,986. **Bonding of Rubber to Fabric, and the Products Thus Obtained.** United States Rubber Co.

560,087. **Flexible Joints in Articles Containing Rigid Parts made from Plastics.** L. H. P. and A. H. Jarrard, (legal representatives of W. J. Jarrard).

560,088. **Securing Tube of Thermoplastic Material to Metal Ferrules and the Like.** L. H. P. and A. H. Jarrard, (legal representatives of W. J. Jarrard), A. S. W. Payne and J. H. Barden.

560,101. **Heating of Thermoplastic Materials by High Frequency Electric Fields.** E. I. du Pont de Nemours & Co., Inc.

560,347. **Improvements in Methods and Apparatus for Applying Adhesives to Shoe Parts.** British United Shoe Machinery Co., Ltd., F. Ricks and C. M. Bagshaw.

560,491. **Coating Surfaces.** C. F. Lumb and Plastic Spray, Ltd.

CHEMICAL

United States

2,347,182. **Preparation of Polymeric Sulphides by Reacting a Mixture of Dithiol and a Diene Hydrocarbon Containing only Ethylenic Unsaturation to Obtain a Viscous to Solid Polymer.** D. D. Coffman, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,347,211. **Sealing Composition Consisting of Reclaimed Rubber, Asphalt, a Mixture of Rosin and a Rosin Soap, a Finely divided Clay, and a Material of the Nature of Short Fiber Asbestos, Contained in a Volatile Solvent.** G. S. Merrill, St. Paul, Minn., and G. P. Hollingsworth, Detroit, Mich., assignors to Minnesota Mining & Mfg. Co., St. Paul, Minn.

2,347,228. **Refined Anthracene and Derivatives thereof.** C. F. Winans, Swissvale, Pa., assignor to Koppers Co., a corporation of Del.

2,347,320. **Bubble-Free Objects of Considerable Thickness from a Casting Composition of Methyl Methacrylate Polymer.** J. R. Hiltner, Morrisville, assignor to Rohm & Haas Co., Philadelphia, both in Pa.

2,347,370. **Preparing an Alkaline Latex Suspension for Use in a Continuous Process of Producing Sheet Rubber by Partially Coagulating the Latex with Sodium Chloride, Adding a Small Amount of Sulphonated Fine Oil to the Curd Suspension, and Then Acidifying to Obtain a Final suspension Having a pH Value of 3 to 4.** B. W. Rowland and D. Fronmuller, both of Appleton, Wis., assignors to Institute of Paper Chemistry, a corporation of Wisconsin.

2,347,494. **N - (Beta - Hydroxyethyl) Hydroxyacetamide.** F. M. Meigs, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,347,525. **Mixed Structures, Foils, Films, and Filaments from Polyamides and Cellulosic Material.** K. Thinius, Eilenburg, Germany; vested in the Alien Property Custodian.

2,347,545. **Artificial Filaments, Yarns, Films, and Other Shaped or Molded Articles from a Polyamide.** H. Dreyfus, London, and R. W. Moncrieff and C. W. Sammons, both of Spondon, both in England, assignors to Celanese Corp. of America, a corporation of Del.

2,347,576. **Method of Obtaining Crude Rubber from the Serum Portion Left after Creaming an Alkali-Preserved Latex, in Which the Rubber in the Serum Portion Is Flocculated with an Acid at a pH above 4.6 in the Presence of a Water-Soluble Alkylene Polyamine Having at Least Three Amino Groups and Being Capable of Raising to above 4.6 the pH at Which Flocculation by Acid Can Be Effected.** S. R. Ogilby, Eltingville, S. I., assignor to United States Rubber Co., New York, both in N. Y.

2,347,618. **Preparing a Stable, Aqueous Dispersion for Sealing and Lining Containers, by Milling Cellulosic Fibers into Rubber so as to Coat the Fibers with Rubber and Then Intensely Working the Resulting Mass with Water and a Dispersing Agent of the Class Consisting of Casein, Glue, Gelatin, Karaya, Sea Moss, and Algin.** K. Tator, Egypt, assignor to Dewey & Almy Chemical Co., North Cambridge, both in Mass.

2,347,636. **Improved Method of Recovering Unsaturated Aldehydes from Mixtures Containing It in the Presence of Water.** L. U. Spence, Elkins Park and F. W. Robinson, assignors to Rohm & Haas Co., both of Philadelphia, both in Pa.

2,347,667. **Isomerizing Piperylene by Reacting Substantially Pure High-boiling Piperylene with Sulphur Dioxide to Form Monomeric Piperylene Sulphone, and Decomposing the Sulphone to Form Low-Boiling Piperylene.** D. Craig, Silver Lake Village, assignor by mesne assignments to B. F. Goodrich Co., Akron, both in O.

2,347,772. **Straight Chain Aliphatic Compounds Containing Two Carbylamine Groups.** H. Dreyfus, London, England, assignor to Celanese Corp. of America, a corporation of Del.

2,347,827. **Linear Polymeric Isothiourea and Salts thereof.** M. Hunt, Claymont, assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, both in Del.

2,347,840. **Product Resulting from the Reaction of an Alkaline Polysulphide with a Substituted Paraffin Hydrocarbon Having a Nitro Group and One Other Radical Reactive with Alkaline Polysulphides on the Same Carbon Atom.** E. M. Nygaard, Woodbury, N. J., assignor to Socony-Vacuum Oil Co., Inc., a corporation of N. Y.

2,347,846. **Products of the Class of 2-Trifluoro Methyl-anthraquinone and Its Chlorine Substitution Products.** O. Scherer, Frankfort a.M., Germany, assignor to General Aniline & Film Corp., New York, N. Y.

2,347,966. **Increasing the Plasticity of Rubber by Subjecting Unvulcanized Rubber to the Action of a Small Amount of an Isothiourea Compound of the Following Formula:**

$$R{-}S{-}C{=}NH.\ R'COOH$$
$$\quad\quad\quad

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taining a Vinyl Aromatic Compound in the Presence of Mesityl Oxide, to Obtain a Polymeric Product of Lower Molecular Weight Than Is Obtainable When Polymerization Is Carried out with Mesityl Oxide under Otherwise Similar Conditions. E. C. Britton and W. J. LeFevre, assignors to Dow Chemical Co., both of Midland, Mich.

2,349,165. **Composition Containing a Non-Gaseous Hydrocarbonaceous Component and an Exothermic Heat Reaction Product of True Resinous Character from a Component of the Group of Glyceride Oils and the Acids Derived therefrom, and an Oxide of the Group of the Alkaline Earth Metal and Magnesium Oxides.** R. R. Grant, Los Angeles, Calif., assignor of one-fourth to M. Isaacson, Dayton O., and S. Shappirio, Washington, D. C.

2,349,173. **Manufacturing Cyclohexene by Heating Ethylene and 1,3-Butadiene at a Temperature below about 300° C. and a Pressure above 1,000 Pounds per Square inch.** L. M. Joshel, Hyattsville, Md., assignor to United States of America as represented by C. R. Wickard, Secretary of Agriculture, and his successors in office.

2,349,191. **Polysulphide Compounds.** J. F. Olin and T. E. Deger, both of Grosse Ile, Mich., assignors to Sharples Chemicals, Inc., a corporation of Mich.

2,349,198. **Polymerizing Styrene in the Presence of at Least 10% by Weight of a Substance Obtained by Alkylating Phenol with Chlorinated Petroleum Wax of about 10% to 25% Chlorine Content in the Presence of a Friedel-Crafts Catalyst and in a Mol Ratio of Combined Chlorine to Phenol Not Less Than about 2 to 1.** O. M. Reiff and A. P. Kozacik, Woodbury, N. J., assignor to Socony-Vacuum Oil Co., Inc., New York, N. Y.

2,349,210. **Refining a Terpene Resinous Copolymer of a Pinene and Styrene by Mixing the Copolymer Resin, Dissolved in a Solvent, with Sodium Acid Sulphate and Zinc in the Presence of at Least a Small Amount of Water.** W. N. Traylor, Hattiesburg, Miss., assignor to Hercules Powder Co., Wilmington, Del.

2,349,232. **Manufacture of Alicyclic Compounds by Heating Ethylene and a 1,3-Diene at a Temperature below about 300° C. and a Pressure above 1,000 pounds per Square Inch.** L. M. Joshel, Hyattsville, Md., assignor to the United States of America as represented by C. R. Wickard, Secretary of Agriculture, and his successors in office.

2,349,412. **Plastic Insulating Composition Consisting of a Conjoint Polymer of a Vinyl Halide with a Vinyl Ester of a Lower Aliphatic Acid, Containing 85% to 95% by Weight of Combined Vinyl Halide and Having an Average Molecular Weight above 18,000. Intimately Combined with Plasticizer in Amounts Ranging from 15% to 60% of the Total Amount of Resin and Plasticizer.** S. D. Douglas, Charleston, W. Va., assignor to Carbide & Carbon Chemicals Corp., a corporation of N. Y.

2,349,413. **Electrical Conductor Carrying an Insulating Composition Consisting of a Resinous Monovinyl Polymer Derived Predominantly from Monomeric Vinyl Chloride and a Plasticizer Including Di (2-Ethylhexyl) Phthalate.** W. F. Hemperly, Bloomfield, N. J., assignor to Union Carbide & Carbon Corp., a corporation of N. Y.

2,349,414. **Plastic Composition Composed of a Homogeneous Dispersion of a Vinyl Resin, Plasticizer, and a Small Amount of Stabilizer.** J. P. Ferrer, South Charleston, and S. D. Douglas, Charleston, both in W. Va., assignors to Carbide & Carbon Chemicals Corp., a corporation of N. Y.

2,349,415. **Process for Extracting an Olefinic Component from a Mixture Containing Olefinic and Paraffinic Components.** A. A. Draeger and W. B. Franklin, both of Baytown, Tex., assignors to Standard Oil Development Co., a corporation of Del.

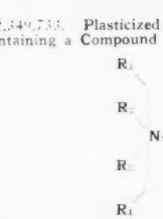
2,349,461. **Lower Aliphatic Amines.** H. R. C. Pratt, Halewood, and G. O. Morris, Eccleston Lane Ends, both in England, assignors to Imperial Chemical Industries, Ltd., a corporation of Great Britain.

2,349,508. **Adhesive Composition Consisting of a High Molecular Weight Polyisobutylene, a Thermoplastic Adhesion and Tack Producing Resin, a Non-Volatile Plasticizer, and, as a Stabilizer, a Liquid Fatty Mono-Ester, Formed by Reacting a Fat Acid with a Monohydric Aliphatic Compound of the Group of Normal Primary Alcohols and Their Glycol Monoethers.** G. Mack, Jackson Heights, N. Y., assignor to Advance Solvents & Chemical Corp., a corporation of N. Y.

2,349,598. **Treating an Aqueous Slurry of 2-Mercaptoarylenethiazole with an Excess of Lime to Produce an Aqueous Solution of the Calcium Salt of the 2-Mercaptoarylenethiazole, Separating This Solution from the Insoluble Impurities and Excess Lime, and Then Treating the Solution with an Acid to Reform the 2-Mercaptoarylenethiazole.** H. P. Roberts, Tallmadge, assignor to Wingfoot Corp., Akron, both in O.

2,349,599. **Producing Dibenzothiazyl Disulphide from a Crude Mercaptobenzothiazole Containing Matter Less Soluble in Lime Water Than in Caustic Soda Solution, by Converting the 2-Mercaptobenzothiazole to Its Calcium Salt and Dissolving It in Water, Separating Insoluble Matter Including the Tarry Matter, and Then Oxidizing to Benzothiazyl Disulphide by a Halogen Gas.** R. W. Moorhouse, Sharon Township, assignor to Wingfoot Corp., Akron, both in O.

2,349,733. **Plasticized Elastic Polychloroprene Containing a Compound of the Formula:**



Where R_1 Is a Radical of the Group of Alkyl, Hydroxy Alkyl, Aralkyl, and Cyclic Alkylene Joined with R_2. Which Is a Radical of the Group of Hydrogen, Alkyl, Hydroxy Alkyl, Aralkyl and Cyclic Alkylene joined with R_1; R and R_3 Are Radicals of the Group of Hydrogen, Open-Chain Aliphatic Hydrocarbon Radicals and Substituted Open-Chain Aliphatic Hydrocarbon Radicals; and A Is the Negative Radical of an Organic Acid of the Group of Carboxylic, Sulphinic and Sulphonic Acids; Neither R_1, R_2, R_3, nor R_4 Supplies Any Acidyl Radical Additional to That Supplied by A. L. H. Howland, Cheshire, Conn., assignor to United States Rubber Co., New York, N. Y.

2,349,749. **Retarding Oxygen Deterioration of Organic Substances by Incorporating N-Aryl N'-alkyl N'-aryl Sulphonyl Arylene Diamine.** P. T. Paul, Naugatuck, Conn., assignor to United States Rubber Co., New York, N. Y.

2,349,756. **Producing a Resin by Reacting a Hydrocarbon Diisocyanate with a Resinous Condensation Product of Formaldehyde with a Monomeric Organic Compound Reactive Therewith.** E. C. Pratt, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,349,759. **Plastic Products Formed by Heating Chlorinated Petroleum Wax with an Aromatic Material of the Group of Phenols and Aromatic Ethers Having at Least Two Nuclear Carbon Atoms Capable of Substitution in the Presence of a Friedel-Crafts Catalyst and Heating the Product with an Olefin Having Conjugate Double Bonds in the Presence of a Friedel-Crafts Catalyst.** O. M. Reiff and J. D. Zech, both of Woodbury, N. J., assignors to Socony-Vacuum Oil Co., Inc., New York, N. Y.

2,349,768. **Resinous Composition from a Polyhydric Alcohol Polyester of Methacrylic Acid.** F. Strain, Akron, O., assignor to Pittsburgh Plate Glass Co., Allegheny County, Pa.

2,349,807. **Recovering Vinyl Acetate from an Aqueous Mixture Containing Such Ester together with a Water-Soluble Ketone.** D. B. Benedict, South Charleston, W. Va., assignor to Carbide & Carbon Chemicals Corp., a corporation of N. Y.

2,349,851. **Polymethylene Di-(Cyanamides).** H. Dreyfus, London, England, assignor to Celanese Corp. of America, a corporation of Del.

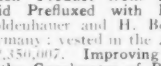
2,349,979. **Plastic Condensation or Polymerization Product from Hexadecane Dicarboxylic Acid Prefluxed with Hydrazine Hydrate.** O. Moldenhauer and H. Bock, both of Hirschberg, Germany; vested in the Alien Property Custodian.

2,350,007. **Improving the Working Properties of the Copolymers of Butadiene and Styrene by Mixing the Polymers with Unsaturated Neutral Distillation Residue from Mineral Oil Treated with Concentrated Sulphuric Acid, and Then Subjecting the Mixture to Approximately 135° C. for One Hour to Two Hours.** C. Zerbe, Hamburg, Germany; vested in the Alien Property Custodian.

2,350,087. **Recovering Vinyl Acetate from an Aqueous Mixture Containing It together with a Water-Soluble Aliphatic Ketone.** D. B. Benedict, South Charleston, W. Va., assignor to Carbide & Carbon Chemicals Corp., a corporation of N. Y.

2,350,147. **Producing an Additive Terpene by Reacting an Alcohol with an Unsaturated Terpene Compound in the Presence of Sulphamic Acid as Catalyst.** J. N. Borglin, assignor to Hercules Powder Co., both of Wilmington, Del.

2,350,199. **Vinyl Resin Which Includes (1) the Products of Conioint Polymerization of a Mixture of Vinyl Chloride and an Acrylic Ester and (2) a Heat and Light Stabilizer Including a Compound of the Formula:**



Where Ar Is an Aryl Radical, and R an Aliphatic Radical Having at Least 9 Carbon Atoms. R. W. Staley, Pittsfield, Mass., assignor to General Electric Co., a corporation of N. Y.

2,350,294. **Preserving Freshly Collected Latex by Treating with Ammonia to Raise the pH of the Latex to not Less Than 9.8 nor More Than 10.0 and Adding a Small Proportion of a Nitro Derivative of an Aromatic Compound of the Class of p-Nitrophenol, p-Nitro-Acetanilide, m-Nitro-Aniline, Nitro-Benzoic Acid, and Alpha-Nitro-Naphthalene.** W. D. Stewart, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

Dominion of Canada

419,359. **Products Resulting from the Interpolymerization of an Ortho or Para Halogen-Substituted Aryl Vinyl Compound with a Butadiene Compound.** Wingfoot Corp., Akron, O., assignee of A. M. Clifford, Stow, O., U. S. A.

419,390. **Compound for Lining Can Ends, Etc., Including Alcohol Soluble Zein and a Plasticizer.** American Can Co., New York, N. Y., assignee of J. E. Robinson, Glen Ellyn, and P. W. Millelot, Jr., Maywood, both in Ill., both in the U. S. A.

419,397. **Compound for Lining Can Ends, Etc., Containing a Copolymer Mixture of Vinyl Resins and a Plasticizer.** American Can Co., New York, N. Y., assignee of J. E. Robinson, Glen Ellyn, and P. W. Millelot, Jr., Maywood, both in Ill., both in the U. S. A.

419,412. **Enamel for Electrical Conductors Produced by Partially Condensing Furfuryl Alcohol and Adding a Drying-Oil Modified Alkyd Resin and a Solvent.** Canada Wire & Cable Co., Ltd., Leaside, Ont., assignee of General Cable Corp., New York, assignee of H. J. Kauth, Rome, both in N. Y., U. S. A.

419,413. **Stable, Organic Solvent-Free Aqueous Dispersions of a Substance of the Group of Polythenes, Derivatives of Polythenes and Ethylene Interpolymers.** Canadian Industries, Ltd., Montreal, P. Q., assignee of A. S. Gomm, Manchester, England.

419,414. **Polymerizable Composition of Methyl Methacrylate and, as an Inhibitor, a Substance Selected from Tannic Acid, Piperidine, Resorcinol and Hydroquinone.** Canadian Industries, Ltd., Montreal, P. Q., assignee of Imperial Chemical Industries, Ltd., London, assignee of F. T. Hamblin, Norton-on-Tees, Durham, and L. W. Codd, Addlestone, Surrey, all in England.

419,416. **Synthetic Linear Polyamide Plasticized with an Alkylaryl Sulphonamide.** Canadian Industries, Ltd., Montreal, P. Q., assignee of G. T. Vaala, Wilmington, Del., U. S. A.

419,417. **Condensation Product of the Formula:**

R CO NH CH_2 S R'

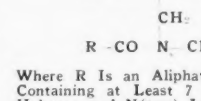
Where R Is a Monovalent Aliphatic Radical of at Least 3 Carbon Atoms Joined through Carbon to the Remainder of the Molecule, and R' Is a Monovalent Aliphatic Hydrocarbon Radical. Canadian Industries, Ltd., Montreal, P. Q., assignee of P. R. Austin and C. E. Frank, both of Wilmington, Del., U. S. A.

419,423. **Granular Polymerization of an Ethenoid Monomer from the Group of Vinyl Esters, Styrene, and Esters of Acrylic and Methacrylic Acids.** Canadian Industries, Ltd., Montreal, P. Q., assignee of D. A. Fletcher, Bloomfield, N. J., U. S. A.

419,426. **Textile Processing Composition Which Is a Stable Aqueous Dispersion of a Polymerized Alkyl Methacrylate.** Canadian Industries, Ltd., Montreal, P. Q., assignee of J. E. Smith, Wilmington, Del., U. S. A.

419,429. **Catalytic Oxidation of Cyclohexanone.** Canadian Industries, Ltd., Montreal, P. Q., assignee of W. J. Amend, Seaford, Del., U. S. A.

419,445. **Water-Repellent Agent of the Formula**



Where R Is an Aliphatic Hydrocarbon Radical Containing at Least 7 Carbon Atoms. X Is a Halogen, and N(tert) Is an Aliphatic or Heterocyclic Tertiary Amine. Imperial Chemical Industries, Ltd., London, assignee of M. A. T. Rogers, Manchester, both in England.

419,463. **Producing a Thermosetting Resin by Dispersing an Alcohol Soluble Protein in a Resin-Forming Phenolic Substance and Condensing the Dispersion with a Resin-Forming Aldehyde in an Aqueous Dispersion of the Materials.** Prolamine Products, Inc., Dover, Del., assignee of American Maize-Products Co., New York, N. Y., assignee of H. M. Weber, Chicago, Ill., all in the U. S. A.

419,530. **Thermoplastic and Oil-Soluble Product Prepared from a Monomeric Styrene Reacted with an Inherently Oil-Soluble Phenol-Aldehyde Resin.** Bakelite Corp. of Canada, Ltd., Toronto, Ont., assignee of R. G. Fulton, Verona, and L. R. Whiting, Woodbridge, both in N. J., U. S. A.

419,627. **Dental Plastic Impression Mass of a Condensation Resin Obtained from an Aromatic Hydrocarbon and Formaldehyde.** Winthrop Chemical Co., Inc., New York, N. Y., U. S. A., assignee of W. Moosdorf, Leverkusen I. G. Werk, Germany.

419,677. **Resinous Ester of Monohydric Alcohol and the Lactone of a Heteropolymer of Vinyl Alcohol and an Unsaturated α, β-Dicarboxylic Acid.** Canadian Kodak Co., Toronto, Ont., assignee of J. G. McNally and R. H. VanDyke, both of Rochester, N. Y., U. S. A.

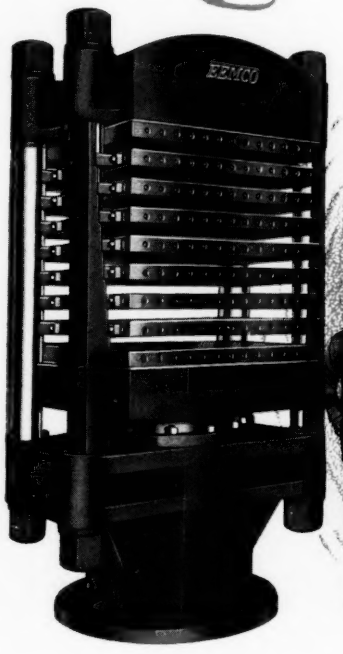
419,692. **Concentrating, Purifying, and Separating the Disperse Phase of Colloidal Dispersions.** Dunlop Plantations, Ltd., London, England, assignee of W. Pauli, Vienna, Germany.

419,726. **Improvement in the Manufacture of Rubber Chloride Varnishes.** Raolin Corp., assignee of M. R. North, administratrix of the estate of C. O. North, deceased, all of Charleston, W. Va., U. S. A.

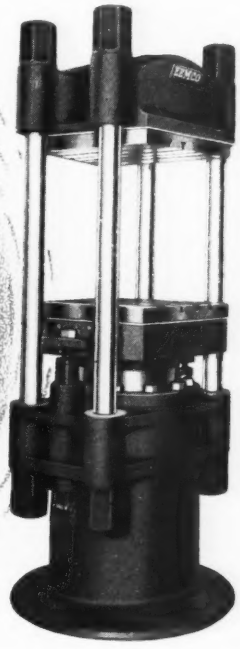
419,727. **Flexible, Homogeneous Plasticized Polyvinyl Alcohol Composition.** Resistoflex Corp., Belleville, assignee of C. Dangelmajer, Nutley, both in N. J., U. S. A.

419,800. **Preparing Polyamides from Cyclic Amides.** Canadian Industries, Ltd., Montreal, P. Q., assignee of W. E. Hanford, Wilmington, Del., U. S. A.

EEMCO Presses



For RUBBER and PLASTICS



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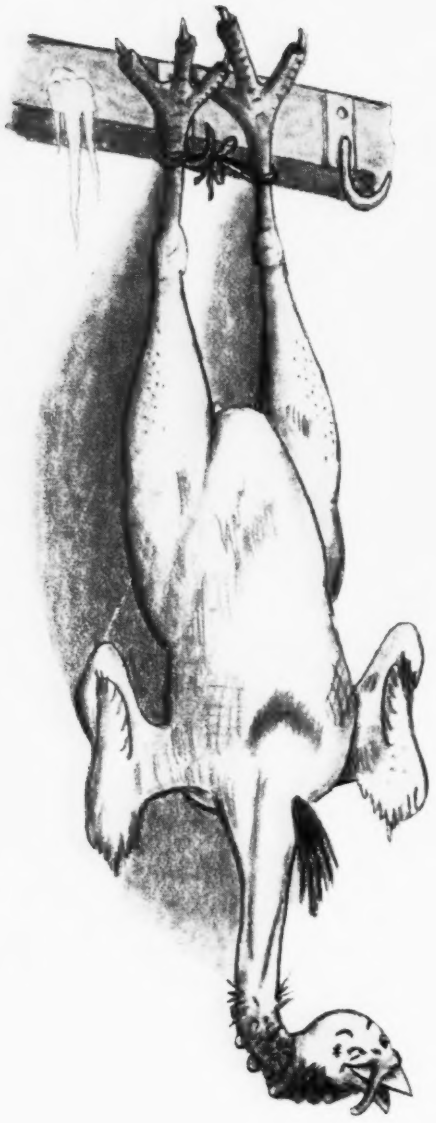

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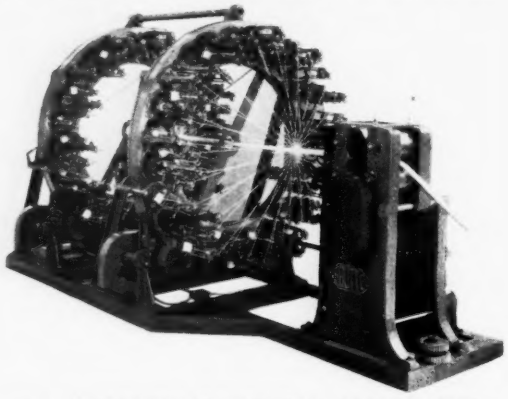

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GREAT BRITAIN

Postwar Estate Problems

In his address at the annual meeting of the Rubber Growers' Association in London, April 27, Chairman Harold F. Copeman, discussed, among other subjects, postwar estate problems. In considering resumption of operations on the estate, he said, three important factors must be considered: staff, labor, and materials. For the resumption of work generally, fullest cooperation between all estate owners is necessary, and with this in view, the RGA Council recently approved the appointment of a body to study the best means of effecting this cooperation.

The problem of obtainmg the necessary trained European staff for supervision was not less cause for anxiety than that of securing adequate native labor. In peacetime practically none of this native labor had been indigenous and consisted chiefly of Chinese and Tamils. The former must have fared badly at the hands of the Japanese, and the Tamils probably did not fare much better and have suffered in health; while long absent from their native India, they would probably be most anxious to be repatriated. For the respective governments to organize matters so as to relieve the labor situation in Malaya and elsewhere would require some time; accordingly the Association proposed to the Colonial Office setting up a small advisory committee to keep under review all the aspects of this problem.

The London Advisory Committee for Rubber Research, which represents growers and manufacturers fully, would be the appropriate organization to consider the question of the form in which rubber should be marketed. This matter was already receiving attention, and from a report of the Imperial Institute it was learned that steps had already been taken to get the views of both British and American rubber manufacturers.

On the vexed question of natural vs. synthetic rubber, Mr. Copeman repeated his view that the two rubbers were complementary to each other, but that this did not mean that natural rubber would be a mere "filler" for synthetic. Referring specifically to tires, he believes that in that sphere natural rubber would reign supreme.

Referring to the Truman Report, Mr. Copeman said he had no wish to make of this subject a hardy perennial, nor did he wish Americans to think that there existed a nagging sense of grievance. But he felt that there were certain misapprehensions about the governments in the Far East and of the plantation industry in particular which should be corrected. Then he went on to review the record of the plantation rubber industry to which Americans and the world at large owed so much and to show how British enterprise, British and Dutch capital and research had not only built up a great industry, but had also helped practically to eliminate malaria and other tropical diseases in the rubber countries and had improved the standard of living of the natives.

At the annual meeting, Hallam Brookfield Egmont Hake was elected chairman suceeding Mr. Copeman, who had just completed his second year in office. Thomas Bradwall Barlow was elected vice chairman of the Association.

Notes on the British Rubber Industry

To release leather for the Armed Forces, more and more soles and heels are now made of compositions based on salvage rubber. The quality of the compounds has been improving rapidly, it is said, and it is hoped to increase durability still further by the inclusion of synthetic rubber in the mixes. Therefore a limited amount of high-grade synthetic rubber was recently made available for this purpose by the Board of Trade.

The footwear repair industry will no longer be able to obtain natural or straight latex for any purpose; only compounded latex cements are now to be had, and these must be used for attaching soles only.

Colonel F. Gore-Brown has resigned as Rubber Controller, following his election as chairman of the Southern Railway Co. He is succeeded as Rubber Controller by Sir Archibald Vyvyan Board, Senior Economy Officer of the Ministry of Supply.

Alexander Johnson, managing director of the North British Rubber Co. and its subsidiary and allied undertakings, has been elected president for the ensuing year of the Federation of British Rubber and Allied Manufacturers' Association. He succeeds Sir Walrond Sinclair. R. H. Comley, joint managing director of the

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Avon India Rubber Co., and H. L. Kenward, director of the India Tire & Rubber Co. and Irish Dunlop Co., have been elected senior and junior vice presidents, respectively, of the Association.

Scottish Notes

Since the manufacture of new tennis balls has been prohibited, a very great shortage of tennis balls exists, and to aid in meeting this shortage to some extent at least, permission was granted to have old balls reconditioned. At first it seemed that in Scotland this step would accomplish little as very few people turned in their old balls. However George MacLellan & Co., Ltd., Maryhill, Glasgow, tennis ball manufacturers, initiated a drive for old balls for recovery and remaking which, it is understood, is having the desired effect. The company aims to recondition 5,000 dozen balls for the current season, but to achieve this goal a considerably larger number than this amount will have to be collected since about 30% of the old balls received so far have had to be rejected.

At the request of physicists employed in Scotland, the Board of the Institute of Physics authorized the formation of a Scottish branch of the Institute with headquarters in Glasgow.

The Association of Scientific Workers meeting in Edinburgh recently, discussed the great possibilities opened up for industry in Scotland by a project for hydro-electricity for the Highlands. The power made available by this scheme would permit the development of the vast raw material resources of the Highlands. One of the raw materials of which Scotland has an abundance is carbide, used in the production of plastics and synthetic rubbers. In view of the rapidly expanding demand for these products, it was pointed out that it was very necessary for Scotland to develop her carbide industry properly, and in order to get the fullest advantage out of such an undertaking, the plastic and synthetic rubber industries should be established in the same areas.

RUSSIA

Production of Gutta Percha

At the same time that the Russians were seeking domestic sources of natural rubber, they also undertook to find gutta-percha yielding plants native to the country or such as would easily be acclimated, and *Eucommia* and Beresklet (*Evonymus verrucosa Scop.*) were selected as the most suitable for cultivation in Russia.

Eucommia, a tree native to China where it is found both in a wild and cultivated state, in certain sections grows 20 meters high. In China it has been known from about the first century of our era for the medicinal properties of its bark, from which a tonic is still prepared. It was as a medicinal plant that it first came to the attention of Europe at the Paris Exposition of 1874, and a few years later individual *Eucommia* trees were planted in France, in Kew gardens in England, and in Washington in the United States.

Before long European botanists discovered the presence of gutta percha in its bark, roots, and leaves. Trees in Chinese plantations yielded from 5% to 12% of gutta percha with a resin content of about 20%.

Experience has shown that certain types of *Eucommia* grow well in various parts of Europe—even as far north as Edinburgh, Scotland—and also in North America, Algeria, and Abyssinia. But the trees were found to have one peculiarity: they were exceedingly difficult to multiply on the large scale that commercial cultivation would require; and this was only partly due to the fact that the imported trees, whether derived from seed or vegetatively, were for the most part—in some places even exclusively—male trees. Long continued experimentation showed that nowhere in the world except in China is large scale multiplication from seed successful. Only comparatively recently, after years of intensive work on grafts, have older *Eucommia* tree in Russia been induced to flower and produce viable seed.

In Russia efforts to cultivate *Eucommia* date back to 1906, when two plants were obtained from Paris by the Sukhum Experiment Station, but despite numerous and varied experiments results were discouraging, and after ten years of effort only 100 plants were developed, including a number of potted plants. No better success, it seems, has been recorded in other countries outside of China.

In 1931 a botanist of the Moscow Botanical Gardens, C. G. Trespe, developed a method of vegetative propagation with cuttings by means of which he succeeded in obtaining 6,000 plants with well-developed root systems in seven months. The cultivation of *Eucommia* on a commercial scale could be started, so the first undertaking for this purpose was organized.

Soviet botanists, however, continued to search for new and better

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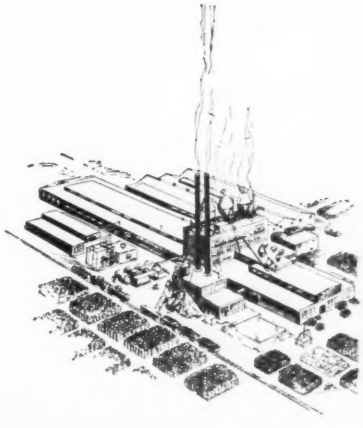

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TAPERED ROLLER BEARINGS

methods of cultivating *Eucommia*. In 1934 a botanist by the name of Kuzner suggested the multiplication of *Eucommia* by a system of layering which he had adapted for the plant. After young plants obtained by the Trespe method have been set out and have thrown out shoots, the latter are bent down to the earth and held in place in the soil by means of wooden pegs. The spring, when the sap is stirring in the plants, is the best time for this work, for then the local formation of roots and of new shoots is promoted so that by the end of the year each of the original shoots not only has its own root system, but also has produced from four to ten additional shoots. The latter grow rapidly, and the following year they too are earthed and in their turn produce roots and other shoots. The process of earthing the latest shoots is usually continued into the third year before the young shoots are separated from the mother plant. The extra shoots are nourished not only by their own root systems, but also by the roots of the mother plant, so what actually takes place is the development of a kind of "feeder" or "nursery" plantation which in about three years presents a dense mass of *Eucommia* with about 20 shoots to the square meter.

Kuzner started with two plants in 1931, and by the Spring of 1934 he had obtained 910 plants with well-rooted shoots two meters high. The efficiency of the Kuzner method seems to have been proved, and it has apparently forced the Trespe method into the subordinate position of serving chiefly as source of material for starting the "nursery plantation."

In spite of the difficulties attached to propagation from seed, efforts in this direction have not been abandoned, and a certain amount of progress has been made. How slow progress is, however, can be seen from the fact that of 2,900 seeds collected in the Sukhum gardens and subsequently planted out, only 143 took.

Eucommia has a high resistance to cold and, as has already been shown, will grow in the North Temperate Zone, but the most suitable climate was found to be in the moist, sub-tropical regions, and the dry tropical regions, provided there are adequate facilities for artificial watering.

The second gutta-percha producing plant exploited in Russia is Beresklet, discovered in 1931 and, at least until 1940, the more important source of gutta percha in Russia. Beresklet, a shrub about two meters high, contains a fairly high proportion of gutta percha chiefly in the roots and in the bark of the stem. It is found in abundance, growing wild, in various parts of the U.S.S.R., from the Leningrad district through Central Russia down to the Crimea and the Caucasus regions. Commercial cultivating seems to offer even more difficulties than *Eucommia* for not only is the proportion of seed that will "take" low, but the process of planting from seed is troublesome, and growth is very slow; while vegetative reproduction, by means of cuttings, is expensive. Nevertheless the high gutta percha content especially of individual shrubs and the comparatively good quality of the product have encouraged continued experimentation in the hopes that eventually a method of multiplication will be found by which high-yielding strains may be produced on a commercial scale.

Meanwhile, despite all difficulties, Beresklet has been planted on 50-acre gardens in numerous districts throughout the most suitable

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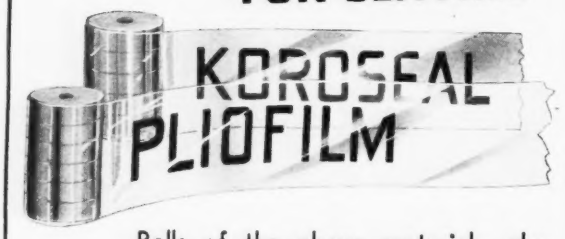

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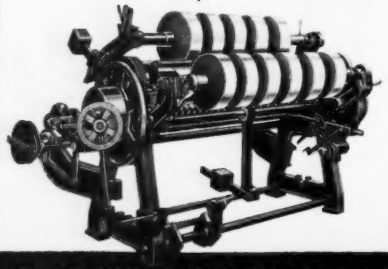

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regions of Central and Southern Russia. The plant attains full productivity when it is eight years old, after which maximum yields are expected. Analysis has shown that in Beresklet most of the gutta percha is in the bark of the roots; the content varies from 10 to 26%, with an average about 18%. However, in the Central Volga district, considered most suited to this shrub, yields as high as 34% have been obtained from individual plants. The bark of the stem contains about 10% gutta percha, but the leaves only about 1%. The resin content of Beresklet gutta percha is very variable and may be anywhere from 9% to 37% in the fresh material. It also has a marked tendency to age, and the resin content of even an originally high-grade gutta percha with initial low resin content, will increase rapidly when stored for three or four years.

Reports have it that the Russians have captured at least 250,000 rubber tires from the Germans since June of last year.

GERMANY

In Germany a process has been developed for making clear-sight window panes for aircraft and automobiles from vinyl polymerized resins or acrylic resins, a German publication claims. It seems that clear sight is achieved with the aid of thin films of conductive metal as gold, silver, platinum, tungsten, tantal, or molybdenum which is sprayed on about 0.001-millimeter thick and forms a resistance in an electrical circuit.

An order reported recently issued by the German authorities in Czechoslovakia, forbids the destruction or processing of waste from the synthetic polyvinyl resins "Igelit" and Mipolam. All such waste must be collected and surrendered to the Tefa Co., a branch of I. G. Farbenindustrie, A. G.

A Central Office for Chemical Standardization, to take charge of and promote standardization of industrial chemistry, has been established with headquarters in Frankfurt a.M.

DENMARK

Increasing quantities of synthetic rubber are being used by the Danish rubber industry, it is learned, and one Copenhagen concern, which had a turnover of 10,000,000 crowns in 1943, was completely converted to the use of synthetic rubber. What articles are manufactured is not specified, but no doubt footwear and probably tires are the main products, and the raw material would come from Germany—unless the Germans have established factories for the production of synthetic rubber in Denmark itself.

SWEDEN

Swedish investigators have been experimenting to produce a satisfactory substitute for leather. But so far only one concern seems to have had any success. This concern, a well-established company, makes the so-called "S-Läderit", a material consisting chiefly of Modotiol (a "Thiokol"-type of rubber) and leather waste. This leather substitute is said to be resistant to temperatures of 28° below zero.

Recently the greater part of the plant was destroyed by fire; however, part of the machinery and the stock of raw material was saved, and production of the imitation leather is expected to be resumed shortly.

AFRICA

Authorities in British West Africa have launched a new measure which, it is hoped, will serve the double purpose of increasing rubber production and of initiating a new social experiment. In the recently opened rubber producing area in the Ikom district of

Nigeria most of the workers will be African prisoners. They will receive a bonus of 2d. for each pound of latex above a certain amount and will also have the opportunity of earning remission for good work. This area has already trebled production in three months, and the new move is expected to add further stimulus to rubber gathering.

From other parts of Africa also come reports of increased rubber harvests. Tanganyika Territory, British East Africa, is expected to attain full rubber production this year. In the last quarter recently reported on, output was ten times as large as in the same period of the preceding year. Reference is here apparently had to plantation rubber, for the report goes on to say that the collection of both wild and salvaged rubber is also being continued.

Outputs in the Belgian Congo were more than five times as high in 1943 as in 1942, and further increases are expected this year. In fact the Governor General of the Belgian Congo was reported to have said in March that production now was more than 1,000 tons monthly, a very substantial increase over the 1943 figures at the end of the year; in 1943 the harvest was 6,210 tons of wild rubber and 1,765 tons of plantation rubber. This was the highest amount hitherto recorded for Belgian Congo; the previous maximum for wild rubber was 6,020 tons in 1901, and for plantation, 1,337 tons in 1942. Though the greater part of the Belgian Congo crop consists of wild rubber, it is said that most of this wild rubber (80%) is of as good quality as average plantation rubber.

INDIA

The Government of India has been encouraging the experimental planting of *Cryptostegia grandiflora*, and it is understood that a suitable area at Muttra, covering some 5,000 acres has been planted with this shrub. The area was expected to come into production in April, and if a satisfactory method of extracting the latex can be developed, it is hoped to extend plantings considerably.

MALAYA

To insure the self-sufficiency of Japanese-occupied Malaya in the matter of tires and tubes, a factory for the production of these goods has been established at Singapore, said a recent Tokyo broadcast.

Apparently contradicting this news is a statement credited by a British paper to a Chinese Evangelist, a Rev. Marcus Cheng, in which it was indicated that hitherto the Japanese had been unable to build tire factories in Malaya. The Reverend Cheng confirmed previous reports as to the inability of the occupiers to make use of Malaya's huge sources of rubber and added that the Japanese have been building wooden sailing ships in Singapore to take at least a part of this rubber to Japan. At the same time it is declared that the natives are hoarding their rubber and not selling it to the Japanese. The Reverend Cheng did not say whether the natives are continuing to tap their gardens and, if so, to what extent.

Heat Problem

(*Continued from page 411*)

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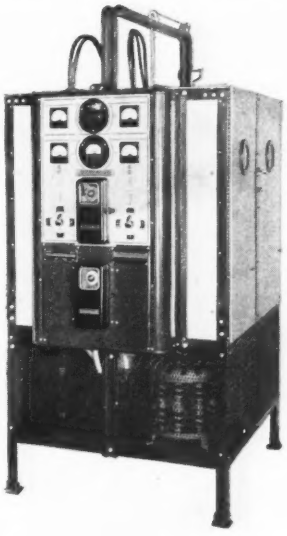

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Editor's Book Table

BOOK REVIEWS

"Modern Synthetic Rubbers." Second Edition. Harry Barron. Published by D. Van Nostrand Co., Inc., 250 Fourth Ave., New York, N. Y. 1944. Cloth, 8¾ by 5½ inches, 355 pages. Indexed. Price $6.50.

Inevitable difficulties in all stages of book production during the war have delayed availability in the United States of this book which was first published in England in 1942. Now a revised and corrected edition, identical with the second British edition (1943), has been published in this country. Although information has not been lacking in technical journals, scientific magazines, and manufacturers' bulletins, this was the first significant book on synthetic rubbers, a topic of everyday conversation in the past few years, to reach the public of any nation. Lack of such a publication in the United States and Germany may be attributed to the lack of time on the part of synthetic rubber technologists who have devoted concentrated effort to experimental and production work in the interest of promoting the war effort of their respective countries. Still this reviewer finds it of sufficient interest for remark that the first publication of its kind should come from a country which is not among the foremost in either synthetic rubber experimentation or manufacture.

Because England has not made any notable contributions to the synthetic rubber industry Mr. Barron has had to center his attention on the technical advancements in America, Germany, and Russia. Although much has been published in the U. S. S. R., the author was limited to the perusal of such few articles which have been translated. His references to German sources are much more comprehensive and form a valuable and as much up-to-date as possible survey of synthetic rubber technolgy in that country. American developments and processes are discussed at much length.

The organization of the book is in three parts. Part I surveys natural and synthetic rubber comparatively from many angles and considers the economic aspects of synthetic elastic materials. Part II devotes eight chapters to the raw materials and production processes of elastomers, including polymerization and copolymerization processes. Part III describes the processing and properties of all the important synthetic rubbers and some that are of lesser import now.

In an approach to the growing confusion in terminology the author reviews several previous definitions and offers a system of nomenclature that in several respects conforms to current practice.

Eighty charts and photographs supplement the text, and 167 tables summarize data on every conceivable phase of the subject.

Because of the rapid advancement of a new industry in wartime no book on synthetic rubber can long be considered of timely importance, but this volume fills the need of basic and fundamental material which has been gathered together with a large degree of unity and completeness. Dr. Barron should be complimented on his wide interest and understanding of this new industry and its problems which have been increased and complicated a hundredfold by the exigencies of military demands.

"Plastics Catalog. The 1944 Encyclopedia of Plastics." Plastics Catalogue Corp., 122 E. 42nd St., New York 17, N. Y. Cloth, 11½ by 8¼ inches, 990 pages. Index. Price $6.

Compiled with the assistance of leading technical authorities in the industry, the latest edition of the "Plastics Catalog" is, like its predecessors, an up-to-date compendium of materials, processes, engineering, machinery, techniques, and products. It is profusely illustrated, and throughout the volume both text and photographs indicate the possibilities for postwar production.

A section on tests and specifications, which includes procedures for identification of plastics, a list of standard testing methods, and the approved A.S.T.M. specifications for plastics materials, is a new feature.

The section on synthetic rubber and rubber-like plastics devotes about 40 pages to butadiene copolymers, chloroprene polymers, isobutene-diolefin copolymers, organic polysulphides, isobutene polymer, vinyl polymers, elastomeric styrene derivative, polyester elastomer, vulcanized vegetable oil polymers, and cyclorubber. The illustrated articles concerning the respective trade-marked products are brief factual accounts of the properties, production, and uses of each.

There are eight charts including one on the properties of 10 synthetic rubbers based on data submitted by manufacturers or published in technical literature. A directory with several lengthy lists on such things as materials, manufacturers and equipment, a glossary, and bibliography on plastics are valuable appendices.

"Annual Report on the Progress of Rubber Technology." Volume VI. 1942. Published by the Institution of the Rubber Industry, 12 Whitehall, London, S.W.I., England. Paper, 9½ by 8¼ inches, 150 pages. Subject and author indexes. Price: I.R.I. members, 2/6; non-members, 10/6.

The important developments in rubber technology and manufacture in a strategic war year are summarized in 22 chapters in the 1942 volume of this series. A short historical and statistical review of that year prefaces authoritative discussions of synthetic rubber, planting and production of raw rubber, chemistry and physics of raw rubber, properties of latex, properties of vulcanized rubber, testing equipment, and compounding ingredients.

Wartime conditions in the British Empire are reflected throughout the volume and especially in the chapters on tires, footwear, mechanical rubber goods, insulation, rubber flooring, surgical goods, hose and tubing, hard rubber, and sponge rubber. As in the previous annual reports, both patent and periodical references are numerous and represent current developments in many countries.

NEW PUBLICATIONS

"Recapping with Synthetic Camelback—Crude or Synthetic Tires." Dominion Rubber Co., Ltd., Montreal, P. Q., Canada. 16 pages. This generously illustrated booklet contains information on the procedures for recapping with synthetic camelback, repairing synthetic rubber tires, and repairing synthetic rubber inner tubes. Additional facts about new synthetic repair material with respect to tackiness, effect of temperature, exposure to air, and storage conclude the booklet.

"Rio Resin in GR-M Ignition Cable Jacket Compound." Booklet No. 3A. R. T. Vanderbilt Co., 230 Park Ave., New York, N. Y. 4 pages. This bulletin reports the results of incorporating Rio Resin in a typical GR-M wire compound in an attempt to reduce shortening and surface hardening. Physical test data and an illustration of samples after 10 hours' exposure to ozone are included. The depth of the hardened surface after severe oven aging at 400° F. was much less with the Rio Resin compounds than the control without Rio Resin, and the tensile properties of the former were therefore better than for the latter.

"Tensile Strength Table." Kathleen S. Rostler and Hubert I. du Pont. Wilmington Chemical Corp., Wilmington, Del. 1944. 28 pages. This table, prepared for rubber laboratory technicians, offers values for tensile strength in pounds per square inch from the pounds recorded by a testing machine and the thickness of the test piece, in tensile strength and over the range common in soft rubber compound testing.

"Butac." J. M. Huber, Inc., 460 W. 34th St., New York 1, N. Y. 2 pages. Laboratory data to show the mild activating effect on thiazole accelerators of Butac, a modified refined pine gum softener, are given in this bulletin. The data also includes the effect of increasing the amounts of Butac used from 5 to 20 parts per 100 of GR-S, both on green and Geer oven aged samples.

"Further Data on Mill Mixing of GR-S Compounds Containing Galex." Technical Service Bulletin No. 22 (Obsoleting Bulletin No. 11). Thiokol Corp., Trenton, N. J. 3 pages. Owing to the fact that during preliminary evaluation work on Galex difficulty may have been experienced by operators unfamiliar with the material, because of sticking of the batch to the rolls during mixing, this report has been issued to outline a well-tried mill mixing technique for Galex stocks which will permit easy handling on laboratory or factory mills. A typical base formula for a Galex friction stock and the approximate physical tests on this compound are given.

"Hycar Blue Book." Hycar Chemical Co., Akron, O. 130 pages. Looseleaf. The "Hycar Blue Book" has been prepared to assist compounders in the use of Hycar synthetic rubbers, and while all the information presented is current, every effort will be made to keep the Blue Book up to date by means of supplemental releases. There are several sections; the first, "General Information", describes the properties of Hycar OR-15, Hycar OR-25, and Hycar OS-10. Other sections are on basic compounding, specific compounding, blends, and factory processing. Hycar OR-15 latex is discussed under a section called "Miscellaneous", which also includes immersion data on this same rubber. Since only a limited number of copies of this Blue Book are available, the Hycar Chemical Co. reports that distribution must be restricted to some extent.

RUBBER ★ SYNTHETIC RUBBER ★ PLASTICS

THE Schuster MAGNETIC CALENDER GAUGE SAVES THAT MATERIAL

For upwards of 15 years, the Schuster Magnetic Calender Gauge has unerringly set rubber calender rolls to a predetermined thickness and correctly maintained that thickness. It has saved the time of handmiking, eliminated human error, saved the stock sampled for calender tests, and assured uniform thickness in the finished product.

All this, *at the right time—before* damage is done. And *continuously*—the only way worth while.

The instrument is simple in design . . . rugged in construction . . . practically without wearing parts . . . adjustable to any thickness. Originally used for rubber, it has taken over just as deftly for synthetic rubber, plastics, cellulose, and other media. No matter what the article, your coating must be thick enough, but not even 1/1000" too thick, or the war effort suffers irreparable loss. No matter what the material, you've got to s-t-r-e-t-c-h it as far as possible—and "possible" daily proves to have a new, elastic meaning.

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"Dutrex 6—Plasticizer and Extender for GR-S Synthetic Rubber." Shell Oil Co., Inc., 50 W. 50th St., New York 20, N. Y. Report No. S-8620. 13 pages. This report summarizes laboratory test data on GR-S compounds for tire treads, footwear, etc., showing the properties obtained with Dutrex 6, a high-molecular-weight hydrocarbon product with a controlled degree of unsaturation and sulphur-reactivity, in comparison with other commercial softeners. Among the conclusions given it is stated that in channel-black compounds at moderate loadings, Dutrex 6 is an effective plasticizer and processing aid with some tackifying action and that in mechanical goods and footwear compounds it produces soft, smooth-processing stocks and strong snappy vulcanizates. It is also stated that Dutrex adds readily to GR-S and imparts excellent milling characteristics.

"R. B. H. Dispersions. Technical Section." R. B. H. Dispersions, Inc., Bound Brook, N. J. April, 1944. 20 pages. This issue of the monthly technical bulletin contains Earl K. Fischer's article, "Outline of Surface-Active Agents," reprinted from Vol. 2, No. 3 (1943) of the *Interchemical Review*. Applications of surface-active agents to manufacturing processes include the impregnation of cotton batting with latex.

"Symposium on the Identification of Water-Formed Deposits, Scales, and Corrosion Products by Physico-Chemical Methods." American Society for Testing Materials, 260 S. Broad St., Philadelphia 2, Pa. 44 pages. The booklet includes three technical papers, general discussion, and an extensive introduction describing the use of physico-chemical methods in identifying water-formed deposit scales and corrosion products. To provide the information a series of tests were carried out in cooperating laboratories involving macrochemical analysis, petrographic examination, and X-ray diffraction. Copies of the booklet can be obtained from A.S.T.M. at 65¢ each.

"The Elasticity of a Network of Long-Chain Molecules—II." L. R. G. Treloar. The British Rubber Producers' Research Association, 19 Fenchurch St., London, E.C.3, England. Publication No. 39. 10 pages. The summary of this booklet states that Wall's treatment of the elasticity of a molecular network is extended to cover the general homogeneous type of deformation of rubber. An equation is derived for the work of deformation in terms of the three principal strains, from which certain general stress-strain relations are deduced. These relations involve only one physical constant of the material. The use of the formulae is illustrated by their application to a number of simple cases. It is shown that the effective rigidity in respect of a shear in a plane at right angles to a previous elongation is inversely proportional to the elongation.

"UL—Symbol of Safety. Fifty Years in the Service of Safety." Underwriters' Laboratories, Inc., 207 E. Ohio St., Chicago, Ill. 32 pages. The annual report for 1943 is prefaced with an historical account of the growth of Underwriters' Laboratories from its inception in 1894. Present authorized research includes investigation of the hazards of styrene and butadiene in the production of synthetic rubber and the ignition hazards of rubber buffings.

"Security and Industry Survey." Merrill, Lynch, Pierce, Fenner & Beane, 70 Pine St., New York 5, N. Y. 56 pages. The current annual edition of this guide for investors analyzes investment possibilities in 28 fields including rubber products. It suggests that the rubber industry's investment standing will be improved if synthetic production results in better stabilization of raw materials after the war.

"Adhesion of 'Thiokol' Type 'FA' Hose Cover Stocks to GR-S Friction Stocks." Technical Service Bulletin No. 21. Thiokol Corp., Trenton, N. J. 2 pages. This report presents data on a "Thiokol" Type "FA" cover stock in conjunction with a GR-S friction stock, showing pounds friction pull to be expected. In addition compound formulae and processing instructions are included.

"Activex." J. M. Huber, Inc., 460 W. 34th St., New York 1, N. Y. 4 pages. Suggested compounding uses and laboratory test data on a new activator for thiazole-type accelerators are included in this bulletin. Tables of activator equivalents comparing Activex with other thiazole activators or secondary accelerators and suggestions for accelerator substitutions as well as for reduced dosage of thiazoles using Activex are presented. A comparison of low MBTS plus Activex is made against a stock equally accelerated with a conventional combination of thiazole and guanidine. The effect on rate of cure of increasing the Activex ratio with a constant dosage of MBTS is also shown.

"Highway Transportation. Post-War Needs." W. Foster Banks. Commerce & Industry Association of New York, Inc., 233 Broadway, New York 7, N. Y. 1944. 21 pages. This booklet surveys the results of the abnormal wartime load on commercial vehicles. The data provide conclusive evidence of the need of the restoration of a crude rubber supply for truck and bus tires. The critical situation will be further aggravated in 1945 unless more natural rubber than is now in sight is available. For the postwar period enactment of legislation beneficial to highway transportation is recommended.

"Geon Resins and Plastics for Calender and Solution Processing." Technical Bulletin PM2. B. F. Goodrich Co., Cleveland 15, O. 4 pages. **"What a Modern Research Laboratory Means to America and You."** Goodyear Tire & Rubber Co., Akron, O. 4 pages. **"Adjustment of Production 'Cut-Backs.'"** War Department, Washington, D. C. 38 pages. **"Zinc Oxide in Smoke Screen."** No. 27 of the series, "Zinc in War." New Jersey Zinc Co., 160 Front St., New York, N. Y. 4 pages. **"Fifteenth Report to Congress on Lend-Lease Operations.** For the Period Ended March 31, 1944." Superintendent of Documents, Washington 25, D. C. 84 pages.

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Regular and Special Constructions
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COTTON FABRICS

Single Filling **Double Filling**
and
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Ducks

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Ducks

Drills

Selected
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NEW YORK

Market Reviews

COTTON & FABRICS

NEW YORK COTTON EXCHANGE WEEK-END CLOSING PRICES

Futures	Apr. 29	May 27	June 3	June 10	June 17	June 24
July	20.88	21.06	21.10	21.40	21.63	21.82
Oct.	19.83	20.16	20.5	20.52	20.82	21.05
Dec.	19.61	19.91	20.00	20.27	20.56	20.85
Jan.	19.53	19.85	19.94	20.19	20.48	20.78
Mar.	19.40	19.69	19.75	20.03	20.30	20.65

A STEADY advance in cotton prices was registered in June with markets soaring to new seasonal highs stimulated by developments in price control legislation, large purchases of cotton cloth by the military, and favorable progress of the European invasion. After final Congressional action on the Price-Control Act, delayed over the disputed cotton pricing amendment, on June 21 cotton prices moved up to the highest levels in 16 years. The $^{15}/_{16}$-inch spot middling price rose steadily from 21.91¢ on June 1 to 22.47¢ on June 19 and closed at 22.47¢ on June 28.

The cotton spinning industry, the United States Census Bureau reported, operated during May at 119.0% of capacity on an eighty-hour week basis, compared with 124.9% in April, 1944, and 134.1% in May, 1943.

Based on June estimates United States 1944 cotton plantings are believed the smallest in 52 years. Acreage planted is reported at 20,151,000 acres, compared with 21,942,000 acres in cultivation July 1, 1943. Estimates of the 1944 Brazilian cotton crop have been set at 2,450,000 bales. Last season Brazil harvested about 2,190,000 bales of cotton.

Fabrics

Trading in gray cloths in June was moderate, and business was largely restricted to directive and priority orders. Production in sheetings for rubber manufacturers is reported to be dropping continuously with the result that priority orders cannot be filled. Army requirements now call for about 300,000,000 yards of duck. It is believed by the industry that these needs will not be met, and substitution of flax for cotton duck is under consideration by the WPB. Reports indicate that while not so much tire fabric is being produced as planned, more tire fabric is being made than tire manufacturers are able to handle because of labor shortages and other factors in tire plants. Rayon cord utilizing a cotton linter base has been found to have considerable value in combination with synthetic rubber in tires as has a fabric combining linters with wood pulp. Efforts have been made to use more nylon tire cord than originally planned. Although 1944 rayon tire cord production will total about 146,000,000 pounds, almost twice the 1943 production, no additional supplies of rayon for civilian use appear possible.

The probable amounts of cotton goods which will be available for unrated civilian purposes was reduced considerably through Conservation Order M-317, amended May 29, which made extensive revision of preference ratings and end uses, boosted minimum priority requirements of mills, increased set-asides for export of many sales yarns and cotton cloths.

In an attempt to speed production of essential cottons the WPB on June 11 assigned urgency ratings to textile mills according to the essentiality of the item produced. Tire cords and fabrics and tire cord yarns and all grades of cotton duck were assigned a rating of 10; and class A and B sheetings a rating of 9. Other less critical items were assigned lower ratings according to production urgency.

New York Quotations

June 28, 1944

Drills		
38-inch 2.00-yard	yd.	....
40-inch 1.45 yard	"	....
50-inch 1.52-yard	"	$0.29
52-inch 1.85-yard	"	.23 7/8
52-inch 1.90-yard	"	.23223/.2325
52-inch 2.20-yard	"	.20511
52-inch 2.50-yard	"	.185
59-inch 1.85-yard	"	.23851
Ducks		
38-inch 2.00-yard D. F.	yd.	.215/.22 5/8
40-inch 1.45-yard S. F.	"	.2975
51½-inch 1.35-yard D. F.	"	.335
72-inch 1.05-yard D. F.	"	.43/.45
72-inch 17-21 ounce	"	.48 7/8
Mechanicals		
Hose and belting	lb.	.4275
Tennis		
51½-inch 1.35-yard	yd.	.315
51½-inch 1.60-yard	yd.	.27 1/8
51½-inch 1.90-yard	yd.	.23 1/8
Hollands — White		
Blue Seal		
20-inch	yd.	.135
30-inch	"	.2425
40-inch	"	.27
Gold Seal		
20-inch	yd.	.145
30-inch	"	.2575
40-inch	"	.29
Red Seal		
20-inch	yd.	.1225
30-inch	"	.22
40-inch	"	.245
Osnaburgs		
40-inch 2.34-yard	yd.	.155 5/8
40-inch 2.48-yard	"	.14 3/4
40-inch 2.56-yard S. F.	"	.14578
40-inch 3.00-yard	"	.1275
40-inch 7-ounce part waste	"	.15
40-inch 10-ounce part waste	"	.21 3/8
37-inch 2.42-yard clean	"	.1525
Raincoat Fabrics		
Cotton		
Bombazine 64 x 60	yd.	....
Plaids 60 x 48	"	....
Surface prints 64 x 60	"	....
Print cloth, 38½-inch, 64 x 60	"	.08971
Sheeting, 40-inch		
48 x 48, 2.50-yard	yd.	.16200
64 x 68, 3.15-yard	"	.13968
56 x 60, 3.60-yard	"	.11944
44 x 40, 4.25-yard	"	.09764
Sheetings, 36-inch		
48 x 44, 5.00-yard	yd.	.08600
40 x 40, 6.15-yard	"	.06991
Tire Fabrics		
Builder		
17¼ ounce 60" 23/11 ply Karded peeler	lb.	.48
Chafer		
14 ounce 60" 20/8 ply Karded peeler	lb.	.48
9¼ ounce 60" 10/2 ply Karded peeler	lb.	.45
Cord Fabrics		
23/5/3 Karded peeler, 1 3/16" cotton	lb.	.44
15/3/3 Karded peeler, 1 3/16" cotton	lb.	.42
12/4/2 Karded peeler, 1 3/16" cotton	lb.	.42
23/5/3 Karded peeler, 1¼" cotton	lb.	.44
Leno Breaker		
8¼ ounce and 10¼ ounce 60" Karded peeler	lb.	.45

SCRAP RUBBER

DEMAND for scrap rubber in June was at May's high levels. Collections in the second quarter were heavier than in the first quarter and are expected to increase during the summer. Scrapped prewar automobiles are regarded as an increasing source of supply. Reclaimers are becoming more stringent concerning contamination of natural scrap with synthetic, and some are applying penalties on such mixed shipments. Larger reclaimers are obtaining a considerable proportion of their scrap requirements from the government stockpile, and the Office of the Rubber Director recently requested them to accept one-third truck and bus tire scrap and two-thirds passenger tires in each lot in order to equalize government stockpile inventories. Reclaimers greatly prefer scrap passenger tires.

Scrap Rubber Ceilings

Inner Tubes†	¢ per Lb.
No. 2 passenger tubes	7¾
Red passenger tubes	7½
Passenger tubes	6
Tires‡	$ per Short Ton
Mixed passenger tires	20.00
Beadless passenger tires	26.00
Solid tires	36.00
Peelings†	
No. 1 peelings	47.50
No. 2 peelings	47.50
No. 1 light colored (zinc) carcass	52.50
Miscellaneous Items‡	
Air brake hose	25.00
Miscellaneous hose	17.00
Rubber boots and shoes	33.00
Black mechanical scrap above 1.15 sp. gr.	20.00
General household and industrial scrap	15.00

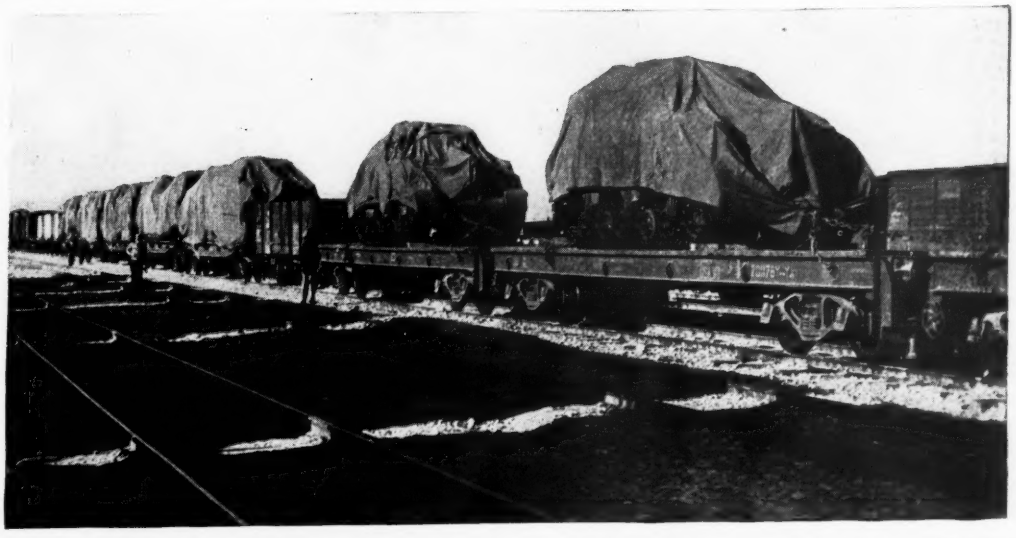
† All consuming centers except Los Angeles.
‡ Akron only.
‡ All consuming centers.

Fixed Government Prices*

Balata	Price per Pound: Civilian Use	Other Than Civilian Use
Manaos Block	$0.38¾	$0.38¾
Swinam Sheet	.42½	.42½
Guayule		
Guayule (*carload lots*)	.17½	.31
Latex		
Normal (*tank car lots*)	.26	.43½
Creamed (*tank car lots*)	.26¾	.44¼
Centrifuged (*tank car lots*)	.27¾	.45¼
Heat-Concentrated (*carload drums*)	.29½	.47
Plantation Grades		
No. 1X Ribbed Smoked Sheets	.22½	.40
1X Thin Pale Latex Crepe	.22½	.40
2 Thick Pale Latex Crepe	.22	.39½
1X Brown Crepe	.21⅞	.38⅞
2X Brown Crepe	.21⅜	.38¾
2 Remilled Blankets (Amber)	.21¼	.38¾
3 Remilled Blankets (Amber)	.21⅛	.38¾
Rolled Brown	.18	.35½
Synthetic Rubber		
GR-M (Neoprene GN)	.27½	.45
GR-S (Buna S)	.18½	.36
GR-I (Butyl)	.16½	.33
Wild Rubber		
Upriver Coarse (crude)	.12⅝	.26¼
(washed and dried)	.20¼	.37¾
Islands Fine (crude)	.14⅝	.28¾
(washed and dried)	.22½	.40
Caucho Ball (crude)	.11⅝	.24¾
(washed and dried)	.19½	.37
Mangabiera (crude)	.08½	.19¾
(washed and dried)	.18	.35¾

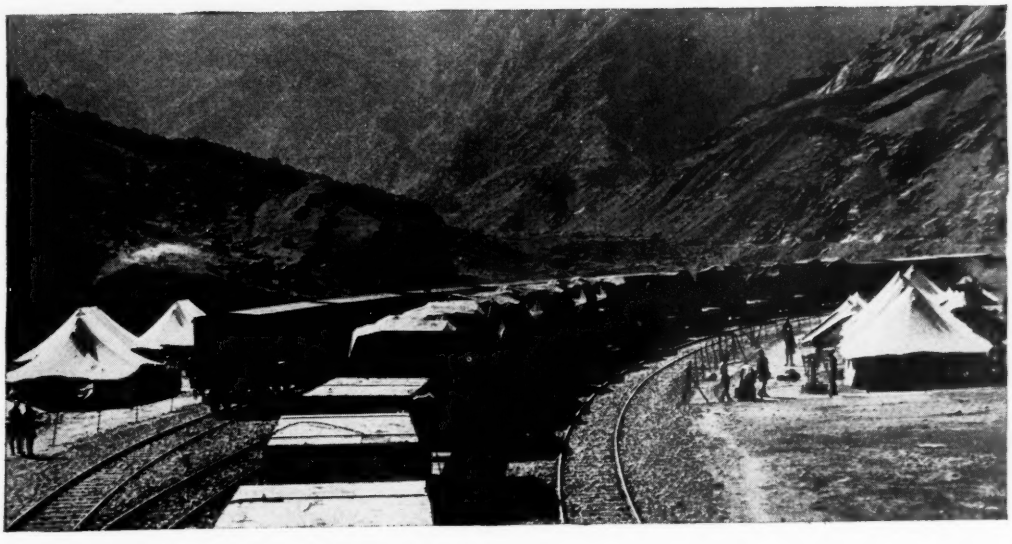
*For a complete list of all grades of all rubbers, including crude, balata, guayule, synthetic, and latex, see Rubber Reserve Co. Circular 17, p. 169, May, 1943, issue.

DUCK GOES TO WAR



Even tanks need the protection of duck if they're to go into immediate action at the end of the trip.

ON EVERY FRONT



Duck tents help make life livable in this sweltering Iranian valley. Note tarpaulins covering freight.

Protected by Duck from heat and rain, American supplies move up to the Russian front. These U. S. Army Signal Corps photos were taken recently in Iran . . . where the sun is blistering. Huge quantities of Duck are needed to protect open freight and bring war-winning materials through all climates and weather, ready for use on arrival. Of eleven Army-Navy "E" awards to mills we represent, eight were awarded for excellence in the production of duck.

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Current Quotations*

Abrasives

Pumicestone, powdered	lb.	$0.035	/$0.04
Rottenstone, domestic	lb.	.025	.03

Accelerators, Inorganic

Lime, hydrated, *l.c.l.*, New York	ton	25.00	
Litharge (commercial)	lb.	.09	
Magnesia, calcined, heavy technical, light	lb.	.0625	/ .07

Accelerators, Organic

A-1	lb.	.28	/ .33
A-10	lb.	.36	/ .42
A-19	lb.	.52	/ .65
A-32	lb.	.60	/ .70
A-77	lb.	.42	/ .55
A-100	lb.	.42	/ .55
Accelerator No. 8	lb.	.63	/ .65
49	lb.	.41	/ .42
552	lb.	1.63	
808	lb.	.59	/ .61
833	lb.	1.13	/ 1.15
Acrin	lb.	.65	
Advan	lb.	.55	
Aldehyde ammonia	lb.	.65	/ .70
Altax	lb.	.43	/ .45
Arazate	lb.	1.53	
B-J-F	lb.	.38	/ .43
Beutene	lb.	.59	/ .64
Butasan	lb.	1.13	
Butazate	lb.	1.13	
Butyl Eight	lb.	.97	/ .99
C-P-B	lb.	1.95	
Captax	lb.	.38	/ .40
D-B-A	lb.	1.95	
Delac A	lb.	.39	/ .48
O	lb.	.39	/ .48
P	lb.	.39	/ .48
Di-Esterex-N	lb.	.50	/ .57
DOTG (Diorthotolyguinidine)	lb.	.44	/ .46
DPG (Diphenylguanidine)	lb.	.35	/ .45
El-Sixty	lb.	.40	/ .47
Erie Accelerator	lb.	.60	/ .62
Ethasan	lb.	1.13	
Ethazate	lb.	1.13	
Ethylidene Aniline	lb.	.42	/ .43
Formaldehyde P.A.C.	lb.	.06	.0625
Formaniline	lb.	.36	.37
Guantal	lb.	.39	.48
Hepteen	lb.	.34	.39
Base	lb.	1.25	1.40
Hexamethylenetetramine U.S.P.	lb.	.39	
Technical	lb.	.33	
Lead oleate, No. 999	lb.	.135	
Witco	lb.	.15	
Ledate	lb.	1.48	
MBT	lb.	.38	/ .40
MBTS	lb.	.43	/ .45
Methasan	lb.	1.23	
Methazate	lb.	1.23	
Monex	lb.	1.53	
Morfex "33"	lb.	.67	/ .72
"55"	lb.	.96	1.01
O-X-A-F	lb.	.38	.43
Para-nitroso-dimethylaniline	lb.	.85	
Pentex	lb.	.74	/ .84
Flour	lb.	.1225	/ .1325
O	lb.		
Flour	lb.		
Phenex	lb.	.49	/ .54
Pipazate	lb.	1.53	
Pip-Pip	lb.	1.63	
Polyac	lb.	1.25	
R & H 50-D	lb.	.42	.43
R-2 Crystals	lb.	1.55	
Rotax	lb.	.48	/ .50
Safex	lb.	1.15	1.25
Santocure	lb.	.60	.67
Selenac	lb.	1.98	
SPDX-G	lb.	.53	/ .58
SRA No. 1 and No. 2	lb.	.53	/ .55
Super-Sulphur No. 2	lb.	.13	/ .15
Tetrone	lb.	1.53	
A	lb.	2.20	
Thiocarbanilide	lb.	.28	/ .33
Thiofide	lb.	.43	/ .50
Thionex	lb.	1.53	
Thiotax	lb.	.38	/ .45
Thiurad	lb.	1.53	
Thiuram E	lb.	1.53	
M	lb.	1.53	
Trimene	lb.	.54	/ .64
Base	lb.	1.03	/ 1.18
Triphenylguanidine (TPG)	lb.	.45	
Tuads	lb.	1.53	
Tuex	lb.	1.53	
2-MT	lb.	.58	/ .60
Ultra	lb.	.99	/ .04
Ureka	lb.	.50	/ .57
Blend B	lb.	.50	/ .57
C	lb.	.48	/ .55
Vulcanex	lb.	$0.42	/$0.43
Z-B-X	lb.	2.45	
Zenite	lb.	.40	/ .42
A	lb.	.45	/ .47
B	lb.	.42	/ .44
Special	lb.	.47	
Zimate, Butyl	lb.	1.13	
Ethyl	lb.	1.13	
Methyl	lb.	1.23	
Zipacel	lb.	1.65	

Activators

Activex	lb.	.20	/ .22
Aero Ac 50	lb.	.46	/ .52
Barak	lb.	.50	
MODX	lb.	.295	/ .345
SL-20	lb.	.1089	/ .1135

Age Resisters

AgeRite Alba	lb.	1.95	/ 2.05
Gel	lb.	.52	/ .54
Hipar	lb.	.61	/ .63
Powder	lb.	.43	/ .45
Resin	lb.	.43	/ .45
D	lb.	.43	/ .45
White	lb.	1.23	/ 1.33
Akroflex C	lb.	.53	/ .55
Albasan	lb.	.69	/ .74
Aminox	lb.	.43	/ .52
Antox	lb.	.54	/ .56
Betanox	lb.	.43	/ .52
B-L-E	lb.	.43	/ .52
Powder	lb.	.61	/ .70
B-X-A	lb.	.43	/ .52
Copper Inhibitor X-872-A	lb.	1.15	
Flectol H	lb.	.43	/ .55
M-U-F	lb.	1.48	
Neozone (standard)	lb.	.61	/ .63
A	lb.	.43	/ .45
C	lb.	.43	/ .45
D	lb.	.43	/ .45
Distilled	lb.	.48	/ .50
E	lb.	.61	/ .63
Oxynone	lb.	.77	/ .90
Permalux	lb.	1.18	/ 1.20
Santoflex B	lb.	.43	/ .45
BX	lb.	.54	/ .64
Santovar-O	lb.	1.15	/ 1.40
Solux	lb.	1.28	/ 1.30
Stabilite	lb.	.48	/ .69
Alba	lb.	.50	/ .74
Thermoflex A	lb.	.61	/ .63
C	lb.	.54	/ .56
Tysonite	lb.	.165	/ .1725
V-G-B	lb.	.43	/ .52

Alkalies

Caustic soda, flake, Columbia (400-*lb. drums*)	100 lbs.	2.70	/ 3.55
Liq'd. 50%	100 lbs.	1.95	
Solid (100-*lb. drums*)	100 lbs.	2.30	/ 3.15

Antiscorch Materials

Antiscorch T	lb.	.90	
Cumar RH	lb.	.105	
E-S-E-N	lb.	.34	/ .39
R-17 Resin (*drums*)	lb.	.1075	
RM	lb.	1.25	
Retarder W	lb.	.36	
Retardex	lb.	.445	/ .475
U-T-B	lb.	.34	/ .39

Antiseptics

Compound G-4	lb.	1.25	
G-11	lb.	5.65	

Antisun Materials

Heliozone	lb.	.23	/ .24
S.C.R.	lb.	.32	/ .34
Sunproof	lb.	.2275	/ .2775

Blowing Agents

Unicel	lb.	.50	

Brake Lining Saturant

B.R.T. No. 3	lb.	.0175	/ .0185

Carbon Black

Conductive Channel—CC

Conductex A	lb.	.05	/ .085
Huber 35-C	lb.	.075	
Spheron C	lb.	.0455	
Voltex	lb.	.105	/ .14

Hard Processing Channel—HPC

Continental F	lb.	.0355†	
Huber HX	lb.	.0355†	
Kosmobile S Dixiedensed S	lb.	.0355†	
Micronex Mark II	lb.	.0355	/ .075
Spheron #4	lb.	.0355†	
Witco 6	lb.	.0355†	

Medium Processing Channel—MPC

Arrow	lb.	.0355†	
Continental A	lb.	.0355†	
Huber TX	lb.	.0355†	
Kosmobile 66 Dixiedensed 66	lb.	.0355†	
Spheron #6	lb.	.0355†	
Standard Micronex	lb.	.0355	/ .075
Witco 1	lb.	.0355†	

Easy Processing Channel—EPC

Continental AA	lb.	.0355†	
Kosmobile 77 Dixiedensed 77	lb.	.0355†	
Micronex W-6	lb.	.0355†	
Spheron #9	lb.	.0355†	
Witco 12	lb.	.0355†,	
Wyex	lb.	.0355†	

Conductive Furnace—CF

Huber FB200	lb.		
Statex A	lb.	$0.08	/$0.10
Sterling I			

Fine Furnace—FF

Statex B	lb.	.07	/ .09

High Modulus Furnace—HMF

Kosmos 40 Dixie 40	lb.	.05	/ .075
Modulex	lb.	.05	
Philblack A	lb.	.05	/ .06
Statex 93	lb.	.05	/ .075
Sterling L			

Semi-Reinforcing Furnace—SRF

Continex	lb.	.035	/ .055
Essex	lb.		
Furnex	lb.	.035	/ .06
Gastex	lb.	.035	/ .06
Kosmos 20 Dixie 20	lb.	.035†	
Sterling	lb.	.035†	
Witco	lb.	.035	/ .055

Fine Thermal—FT

P-33	lb.	.0475	

Medium Thermal

Thermax	lb.	.0225	
Velvetex	lb.		

Colors

Black

Lampblack (commercial), *l.c.l.*	lb.	.15	

Blue

Du Pont Powders	lb.	2.25	/ 3.75
Toners	lb.		

Brown

Mapico	lb.	.1135	

Green

Chrome	lb.	.25	
Oxide (*freight allowed*)	lb.	.25	
Du Pont Powders	lb.	1.00	
Guignet's (*bbls.*)	lb.	.70	
Toners	lb.		

Orange

Du Pont Powders	lb.	2.75	/ 3.05
Toners	lb.		

Orchid:

Pink:

Purple:

Red

Antimony Crimson, 15/17%	lb.		
R.M.P. No. 3	lb.	.48	
Sulphur free	lb.	.52	
Golden 15/17%	lb.		
7-A	lb.	.37	
Z-2	lb.	.25	
Du Pont Powders	lb.	.48	/ 1.65
Iron Oxide, *l.c.l.*	lb.	.07	/ .15
Mapico	lb.	.0885	/ .096
Rub-Er-Red (*bbls.*)	lb.	.0975	
Toners	lb.		

White

Lithopone (*bags*)	lb.	.0425	/ .045
Albalith	lb.	.0425	/ .045
Azolith	lb.	.0425	/ .045
Titanium Pigments			
Ray-Bar	lb.	.0575	/ .0625
Ray-Cal	lb.	.055	/ .06
Rayox	lb.	.145	/ .155
Titanox-A LO and MO	lb.	.145	/ .15
C	lb.	.055	/ .0575
Ti-Tone	lb.		
Zopaque (50-*lb. bags*)	lb.	.145	/ .1525
Zinc Oxide			
Azo ZZZ-11	lb.	.0725	/ .075
44	lb.	.0725	/ .075
55	lb.	.0725	/ .075
66	lb.	.095	/ .0975
French Process, Florence			
Green Seal-8	lb.	.09	/ .0925
Red Seal-9	lb.	.085	/ .0875
White Seal-7	lb.	.095	/ .0975
Kadox, Black Label-15	lb.	.0725	/ .075
No. 25	lb.	.085	/ .0875
72	lb.	.0725	/ .075
Red Label-17	lb.	.0725	/ .075
Horse Head Special 3	lb.	.0725	/ .075
XX Red-4	lb.	.0725	/ .075
23	lb.	.0725	/ .075
72	lb.	.0725	/ .075
78	lb.	.0725	/ .075
80	lb.	.0725	/ .075
103	lb.	.0725	/ .075
110	lb.	.0725	/ .075
St. Joe (lead free)			
Black Label	lb.	.0725	/ .075
Green Label	lb.	.0725	/ .075
Red Label	lb.	.0725	/ .075
U.S.P.	lb.	.105	/ .1075
Zinc Sulphide Pigments			
Cryptone-BA-19	lb.	.056	/ .0585
BT	lb.	.056	/ .0585
CB	lb.	.056	/ .0585
MS	lb.	.0575	/ .06
ZS No. 20	lb.	.0825	/ .085
86	lb.	.0825	/ .085
230	lb.	.0825	/ .085
800	lb.	.0825	/ .085

Yellow

Du Pont Powders	lb.	.70	/ 1.75
Mapico	lb.	.0685	/ .071
Toners	lb.		

Dispersing Agents

Bardex	lb.	.0425	/ .045
Bardol	lb.	.025	/ .0275
B	lb.	.05	/ .0525
Nevoll (*drums, c.l.*)	lb.	.02	/ .025

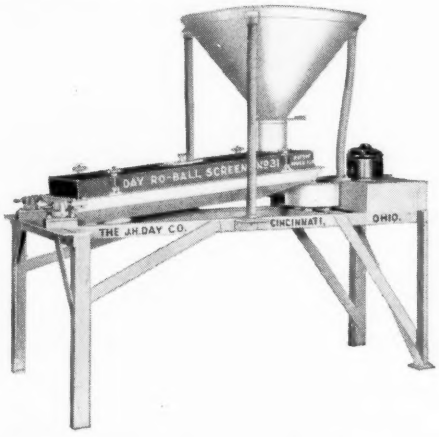
*Prices in general are f.o.b. works. Range indicates grade or quantity variations. Space limitation prevents listing of all known ingredients. Prices are not guaranteed, and those readers interested should contact suppliers for spot prices.

†Price quoted is f.o.b. works (bags). The price f.o.b. works (bulk) is $0.033 per pound. All prices are carlot.

‡Because of difficulty in interpreting OPA ceilings, consumers should contact supply houses for prices.

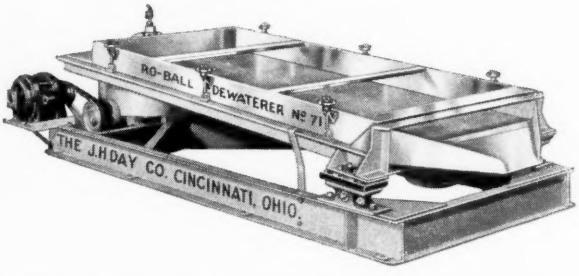
Ro-Ball Screens for the Rubber Industry

The action of the screen box, which operates at a nearly level angle, combines with the Day Super-Active Ball Cleaning Device to produce an effective screening action.



The Ro-Ball above is a No. 31, Hopper Feed, Closed Top Type which is used extensively for processing of natural or compounded rubber products, where sulphur, oxides, etc., are used, and dust tight construction is required.

These machines can be furnished in either single or multiple screen construction and in various sizes to meet all requirements.



The open construction shown above is used extensively for dewatering operations where caustics are used in reclaiming rubber. These units can be furnished in various sizes to meet all production requirements.

The J.H.DAY Company
CINCINNATI 22 OHIO.

CALCINED MAGNESIA

(Magnesium Oxide)

EXTRA LIGHT

The Original Neoprene Type

A supreme quality product for the rubber trade. Extremely fine state of division. Improves storage stability and resistance to scorching. A curing agent unexcelled for increased modulus, greater resilience, reduced heat build-up, lower compression set and retention of tensile strength during heat service.

LIGHT

A high quality product of greater density than "Extra Light," but high in MgO and low in impurities. An excellent value for many uses.

MEDIUM

A good value. Very active. High Magnesia content, low in impurities. Medium density.

HEAVY

All types can be furnished. Specially ground to meet the exacting Code Pigment Specifications of the Rubber Trade. Unground types for chemical uses.

PACKAGES — Specially designed to protect contents from moisture and air. Corrugated carton with special water-proof liner, and inner paper liner. Five-ply multi-wall bag, including asphalt liner.

WAREHOUSE STOCKS—Maintained at Philadelphia, New York, Chicago and Akron.

Special Services for All Requirements of the Rubber Trade

GENERAL MAGNESITE & MAGNESIA COMPANY

Specialist in Magnesia

MANUFACTURERS—IMPORTERS—DISTRIBUTORS

2960 East Venango St.
PHILADELPHIA 34, PA.

SALES REPRESENTATIVES:

AKRON—The C. P. Hall Co.
BOSTON (Cambridge)—William D. Egleston Co.
BROOKLYN—Smith Chemical & Color Co.
BUFFALO—Commercial Chemicals, Inc.
CHICAGO—The C. P. Hall Co.
DENVER—The Denver Fire Clay Co.
DETROIT—C. L. Hueston
LOS ANGELES—The C. P. Hall Co. of California.
MONTREAL—Canadian Industries, Ltd.
NEWARK, N. J.—Chas. S. Wood & Co., Inc.
PORTLAND, ORE.—Miller & Zehrung Chemical Co.
ST. PAUL, MINN.—George C. Brandt, Inc.
SEATTLE, WASH.—Carl F. Miller & Co.
TRENTON, N. J.—General Supply & Chemical Co.

Extenders

Advagum 1098	lb.	$0.42	
1198	lb.	.40	
Extender C	lb.		
15	lb.	.32	
Naftolen R-100	lb.	.10	/$0.12
Oroplast	lb.	.11	/ .155
"600"	lb.	.14	/ .16
Vanzak	gal.	.05	/ .06

Fillers, Inert

Asbestos Fiber	ton	15.50	/ 48.00
Barytes	ton	40.00	
f.o.b., St. Louis (50-lb. paper bags)	ton	25.55	
Off color, domestic	ton	29.00	
White, domestic	ton	38.50	/ 40.00
Blanc fixe, dry, precip.	ton	80.00	
Calcene	ton	37.50	/43.00
Infusorial earth	lb.	.0225	
Kalite No. 1	ton	26.00	
Kalvan	ton	100.00	
Magnesium carbonate l.c.l.	lb.	.0725/	.1075
Paradene No. 2 (drums)	lb.	.0525	
Pyrax A	ton	7.10	
Talc	ton	25.00	/ 35.00
Whiting			
Suprex White (precipitated calcium carbonate)	ton	32.50	
Witco, c.l.	ton	8.00	
Witcarb	ton	100.00	
R-12	ton	50.00	

Finishes

Mica, l.c.l.	ton	20.00	/85.00
Rubber lacquer, clear	gal.	1.00	/ 2.00
Colored	gal.	2.00	/ 3.50
Shoe varnish	gal.	1.45	

Flock

Cotton flock, dark	lb.	.095	/ .112
Dyed	lb.	.45	/ .85
White	lb.	.12	/ .20
Rayon flock, colored	lb.	1.00	/ 1.50
White	lb.	.75	/ 1.25

Latex Compounding Ingredients

Accelerator 89	lb.	1.20	
Advawet	lb.	.46	
Aerosol (drums)	lb.	.35	
Antox, dispersed	lb.	.54	
Aquarex F	lb.	.85	
Areskap No. 50	lb.	.18	/ .24
100, dry	lb.	.39	/ .51
Aresket No. 240	lb.	.16	/ .22
300, dry	lb.	.42	/ .50
Aresklene No. 375	lb.	.35	/ .50
400 dry	lb.	.51	/ .65
Black No. 25, dispersed	lb.	.22	/ .40
Casein	lb.	.24	/.2475
Collocarb (Dispersed Wyex)	lb.	.06	/ .07
Color pastes, dispersed	lb.	.75	/ 1.10
Copper Inhibitor X-872	lb.	2.25	
Darvan No. 1	lb.	.30	/ .34
2	lb.	.30	/ .34
Dispersex No. 15	lb.	.11	/ .12
20	lb.	.08	/ .10
Factex Dispersion A	lb.	.185	
Heliozone, dispersed	lb.	.25	
MICRONEX, Colloidal	lb.	.06	/ .07
Neoprene Latex Extender Emulsion 17	lb.	.12	/ .14
Resin V	lb.	.13	
S-1 (400-lb. drums)	lb.	.65	
Santobrite Briquettes	lb.		
Powder	lb.		
Santomerse D	lb.	.41	/ .65
S	lb.	.11	/ .25
Sodium Stearate	lb.	.40	
Stablex A	lb.	.90	/ 1.10
B	lb.	.70	/ .95
C	lb.	.40	/ .50
Sulphur, dispersed	lb.	.10	/ .15
No. 2	lb.	.08	/ .12
T-1 (440-lb. drums)	lb.	.40	
Tamol R	lb.	.16	/ .25
Tepidone	lb.	.63	
Tritons	gal.	.15	/ .37
Tysonite, dispersed	lb.	.32	/ .35
Zinc oxide, dispersed	lb.	.12	/ .15

Mineral Rubber

Black Diamond, l.c.l.	ton	25.00	/30.00
B.R.C. No. 20	lb.	.0105/	.0115
Hydrocarbon, Hard	ton	25.00	/27.00
MilliMar	lb.	.055	
Parmr	ton	25.00	/30.00
Pioneer, c.l.	lb.	25.00	/30.00
285°-300°	ton	25.00	/27.00

Mold Lubricants

Aluminum Stearate	lb.	.23	/ .24
Aquarex D	lb.	.60	
MDL Paste	lb.	.25	
Colite	gal.	.90	/ 1.15
Dipex Mold Wash	lb.		
Lubrex	lb.	.25	/ .30
Rubber-Glo, conc. regular	gal.	.94	/ 1.15
Type W	gal.	.99	/ 1.20
Sericite	ton	65.00	
Soapstone, l.c.l.	ton	25.00	/35.00
Zinc Stearate	lb.	.30	/ .31

Oil Resistant

A-X-F	lb.	.82	/ .85

Reclaiming Oils

B.R.V.	lb.	.035	/ .0375
C-10	gal.	.19	/ .24
D-4	gal.	$0.17	/$0.22
E-5	gal.	.15	/ .20
No. 1621	lb.	.021	/ .0235
S.R.O.	lb.	.02	/ .0225
X-60 (reclaiming)	gal.	.20	/ .27
X-443	gal.	.29	

Reenforcers, Other Than Carbon Black

Alumina, Hydrated			
Alorco C-740	lb.	.0375/	.065
C-741	lb.	.0375/	.065
Buca	ton	40.00	
Carbonex Flakes	lb.	.03	/ .035
S	lb.	.031	/ .036
Plastic	lb.	.031	/ .0335
Clays			
Aerfloted Hi-White	ton	10.00	
Paragon	ton	10.00	
Suprex	ton	11.00	/23.50
Catalpo, c.l.	ton	30.00	
Champion	ton	11.00	
China	ton	25.00	
Dixie	ton	11.00	
Hydratex R	ton	20.00	
"L"	ton	10.00	
Langford	ton	8.50	
Magnolia	ton	10.00	
McNamee	ton	10.00	
#33	ton	30.00	
Par	ton	11.00	
Paraforce, c.l.	ton	50.00	
Witco, c.l.	ton	10.00	
Cumar EX	lb.	.0525	
MH	lb.	.065	/ .115
V	lb.	.095	/ .125
465 Resin	lb.	.035	
"G" Resin	lb.	.08	
Nevindene	lb.	.105	/ .135
Silene "EF"	lb.	.055	/ .06

Reodorants

Amora (ABCD)	lb.		
Coumarin	lb.	2.75	/ 3.25
Curodex 19	lb.	4.75	
188	lb.	5.75	
198	lb.	6.75	
Para-Dors (ABCD)	lb.	1.00	/ 3.40
Rodo No. 0	lb.	4.00	/ 4.50
10	lb.	5.00	/ 5.50
Vanillin	lb.	2.35	/ 2.95

Rubber Substitutes

Black	lb.	.095	/ .17
Brown	lb.	.095	/ .18
White	lb.	.10	/ .20
Factice			
Amberex Type B	lb.	.20	
Brown	lb.	.095	/ .19
Neophax A	lb.	.165	
B	lb.	.165	
White	lb.	.10	/ .20

Softeners and Plasticizers

Abalyn	lb.	.0722/	.0947
Ambidex Regular	lb.	.225	/ .23
"S"	lb.	.225	/ .23
B.R.T. No. 7	lb.	.02	/ .021
Belro Resin	100 lb.	2.71	/ 3.00
Bondogen	lb.	.98	/ 1.05
Buna Modifier 56-40	lb.	.30	/ .31
Bunnatol (for synthetic rubber)	lb.		
G	lb.	.40	/ .50
S	lb.	.40	/ .50
Burgundy pitch	lb.		
Butac	lb.	.085	/ .105
Circosol-2XH Elasticator for GR-S	gal.		
Dibenzyl Sebacate	lb.	.67	/ .74
Phthalate	lb.	.51	/ .59
Dibutyl Sebacate	lb.	.48	/ .565
Dicapryl Phthalate	lb.	.25	/ .30
Dipentene	gal.	.56	/ .58
Dipolymer Oil	gal.	.33	/ .38
Dispersing Oil No. 10	lb.	.0375/	.04
Duraplex C-50 LV, 100%	lb.	.25	/ .295
Falkomer 106	lb.	.30	
108	lb.	.30	
Galex	lb.	.065	/ .20
Hercolyn	lb.	.1122/	.1347
JMH	lb.	.65	/ .67
Myristilene	lb.	.20	/ .30
Nevinol	lb.	.13	/ .14
No. 1-D Heavy Oil	lb.	.04	
Nuba resinous pitch (drums)			
Grades No. 1 and No. 2	lb.	.029	
3-X	lb.	.0425	
Palm oil (Witco) c.l.	lb.		
Palmalene	lb.	.15	
Palmol	lb.	.16	/ .25
Para Flux (reg.)	gal.	.17	/ .18
No. 2016	gal.	.135	/ .19
Para Lube	lb.	.046	/ .048
Paradene No. 1 (drums)	lb.	.0525	
Special (drums)			
20 to 35° C. M.P.	lb.	.0625	
35 to 45° C. M.P.	lb.	.0625	
45 to 75° C. M.P.	lb.	.0575	
Paraplex G-25, 100%	lb.	.75	
Phthalate	lb.	.51	/ .59
Paroils	lb.	.0975/	.18
Piccocizer "30"	lb.		
Piccolyte Resins	lb.	.15	/ .185
Piccoumaron Resins	lb.	.045	/ .15
Pictar	gal.	.18	/ .23
Pine tar	gal.		
Oil	gal.	.45	
Plasticizer B	lb.	0.35	/ 0.45
35	lb.	.205	/ .24
36	lb.	.305	/ .34
Plastoflex No. 10	lb.	.20	
No. 20	lb.	$0.25	
Plastogen	lb.	.0775	/$0.08
Plastone	lb.	.27	/ .30
Poly-pale Resin	lb.	.06	/ .07
R-19 Resin (drums)	lb.	.1075	
21 Resin (drums)	lb.	.1075	
Reogen	lb.	.115	/ .12
Resin R6-3	lb.	.38	/ .40
Rio Resin	lb.	.36	/ .38
RPA No. 1E	lb.	.55	
2	lb.	.65	
3	lb.	.46	
4	lb.	.80	
5	lb.	.57	
Santicizer B-16	lb.	.32	/ .36
E-15	lb.	.34	/ .38
M-17	lb.	.355	/ .39
Solvenol	gal.	.56	/ .58
Staybelite	lb.	.06	/ .065
Tarzac	lb.	.23	/ .24
TP-10	gal.	.55	/ .75
90	gal.	.55	/ .65
Tricresyl Phosphate	lb.	.24	/ .245
Triphenyl Phosphate	lb.	.26	/ .27
Turgum "S"	lb.	.0675	
Vinsol Resin	lb.	.025	/ .035
Vistac No. 1	lb.	.20	/ .214
No. 2	lb.	.214	/ .227
Witco No. 20, l.c.l.	gal.	.20	
X-1 resinous oil (tank car)	lb.	.011	/ .016
XX-100 Resin	lb.	.0525	

Softeners for Hard Rubber Compounding

Resin C Pitch 45°C. M.P.	lb.	.015	/ .016
60°C. M.P.	lb.	.015	/ .016
75°C. M.P.	lb.	.015	/ .016

Solvents

Beta-Trichlorethane	lb.	.20	
Carbon Bisulphide	100 lbs.	5.75	
Tetrachloride	gal.	.80	
Cosol No. 1	gal.	.26	/ .34
No. 2	gal.	.25	/ 23
No. 3	gal.	.22	/ .30
Industrial 90% benzol (tank car)	gal.	.15	/ .22
Nevsol	gal.	.245	/ .31
Picco	gal.	.22	/ .32
Skellysolve	gal.		
Tollac	gal.	.28	/ .33

Stabilizers for Cure

Barium Stearate	lb.	.29	/ .32
Calcium Stearate	lb.	.26	/ .27
Laurex (bags)	lb.	.1475/	.1725
Lead Stearate	lb.		
Magnesium Stearate	lb.	.31	/ .32
Stearex, single pressed	lb.	.15 3/4	/.16 3/4
double pressed	lb.	.15 7/8	/.16 7/8
Beads	lb.	.14 7/8	/.15 7/8
Stearic acid, single pressed	lb.		
Stearite, c.l.	lb.	.1487	
Zinc Laurate	lb.	.29	/ .32
Stearate	lb.	.30	/ .31

Synthetic Rubber

Chemigum N-1	lb.	.53	/ .60
Hycar OR-15	lb.	.56	/ .72
OR-25	lb.	.50	/ .66
OS-10	lb.	.50	/ .66
Neoprene Latex Type 571 dry weight	lb.	.50	
60	lb.	.60	
Neoprene Type CG	lb.	.70	
E	lb.	.65	
FR	lb.	.75	
GN	lb.	.28	
ILS	lb.		
KNR	lb.	.75	
Perbunan 26	lb.	.53	
Synthetic 100	lb.	.41	
"Thiokol" Type "A"	lb.	.35	/ 1.40
"FA"	lb.	.50	/ 1.60
Molding powder No. 472	lb.	.61	
1001	lb.	.75	
Water Dispersions ("Thiokol" Latex) dry weight			
MF	lb.	.70	/ .80
MX-3112	lb.	.65	/ .75
WD-2	lb.	.75	/ .85

Tackifiers

B.R.H. No. 2	lb.	.02	/ .021
P.H.O. (drums)	lb.	.24	
Plastac	lb.	.12	
TY-PLY Q	gal.	6.75	/ 8.00
A	lb.	6.75	/ 8.00
S	gal.	6.75	/ 8.00
A	gal.	6.75	/ 8.00

Vulcanizing Ingredients

Magnesia, light (for neoprene)	lb.	.25	
Sulphur	100 lbs.	2.05	
Insoluble, 60	lb.	.16	
Telloy	lb.	1.75	
Thiogen 6	lb.	.18	/ .25
10	lb.	.18	/ .25
Tonox	lb.	.50	/ .59
Vandex	lb.	1.75	
(See also Colors—Antimony)			

Waxes

Carnauba, No. 3 chalky	lb.	.7125	
2 N.C.	lb.	.7575	
3 N.C.	lb.		
1 Yellow	lb.	.8325	
2	lb.	.8125	
Carnube	lb.	.49	/ .59
Monten	lb.	.12	/ .17
Rubber Wax No. 118			
Neutral	gal.	.76	/ 1.31
Colors	gal.	.86	/ 1.41

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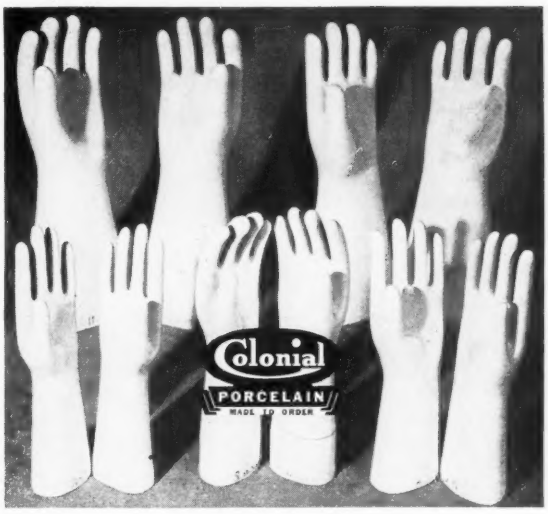

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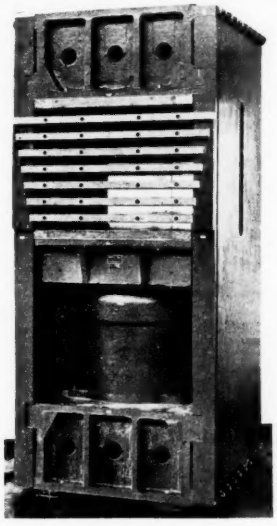

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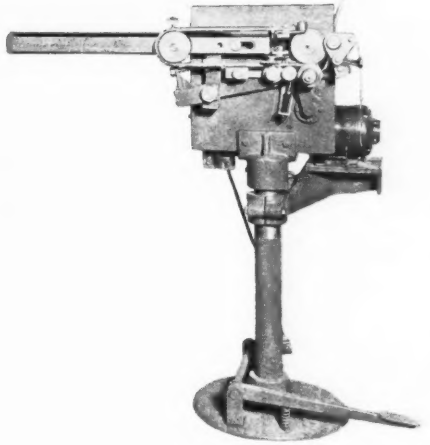

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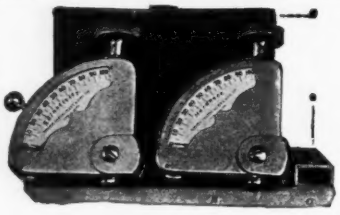

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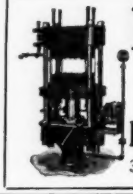

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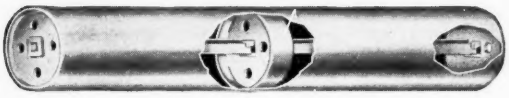

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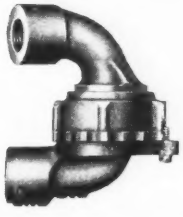

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Wood, R. D., Co. —

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Yarnall-Waring Co. —

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